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ICREM8

Program and Abstracts

The 8th International Conference on Research and Education in Mathematics 2017

August 11 – 13, 2017
Institut Teknologi Bandung, Indonesia

Editors:
Eric Harjanto
Utriweni Mukhaiyar
Dellavitha Nasution
Rinovia Simanjuntak
Erma Suwastika

Published by
Faculty of Mathematics and Natural Sciences
Institut Teknologi Bandung

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Hosted and Organized by:

Mathematics Program, Faculty of Mathematics and Natural Sciences,
Institut Teknologi Bandung

Scientific Committee Member:

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Words of Welcome

Rinovia Simanjuntak

Chair of ICREM 2017 Organizing Committee

On behalf of the organizing committee of 8th International Conference on Research and Education in Mathematics (ICREM 2017), I would like to welcome all participants of ICREM 2017 in Bandung and in our ITB Campus.

The International Conference on Research and Education in Mathematics is a biennial conference series jointly organized by Institute for Mathematical Research (INSPEM), Universiti Putra Malaysia, Institute of Mathematics, Vietnam Academy of Science and Technology (IMVAST), and Mathematics at Institut Teknologi Bandung (MA-ITB). It is aim in bringing together mathematicians, scientists and industrialists from around SouthEast Asia and the world to share knowledge, exchange idea, collaborate, and present research results on all aspects in mathematics and its applications. I hope the conference will provide opportunities for the participants to exchange new ideas and application experiences, to establish research networks, and to find global partners for future collaboration.

I would like to thank the keynote and invited speakers of ICREM 2017: Motoko Kotani (Tohoku University, Japan), Phùng Hô Hai (Institute of Mathematics, Vietnam Academy of Science and Technology), Marian Roque (University of The Philippines Diliman), Aida Suraya (Universiti Putra Malaysia), Maman Djauhari (Centre for Research in Statistics and Data Analysis), and Johan Matheus Tuwankotta (Institut Teknologi Bandung). I would also like to express our gratitude to Faculty of Mathematics and Natural Sciences ITB and Institute for Reseacrh and Community Services ITB for their generous support towards the conference.

I wish you an enjoyable stay in Bandung and a fruitful conference.

Bandung, 8 August 2017
Dr. Rinovia Simanjuntak
Chair of ICREM 2017 Organising Committee

General Agenda Of ICREM 8th, 2017

Time	Friday 11-Aug-17		Saturday 12-Aug-17		Sunday 13-Aug-17	
	Main Activities	Additional Event	Main Activities	Additional Event	Main Activities	Additional Event
08.00 - 08.30	Registration					
08.30 - 09.00						
09.00 - 09.15	Opening Session and Group Photos		Keynote Speaker: Motoko Kotani (Tohoku University, Japan)			
09.15 - 09.30					Plenary Lecture 4: Aida Suraya (Universiti Putra Malaysia)	
09.30 - 10.00						
10.00 - 10.30	Coffee Break		Coffee Break		Coffee Break	
10.30 - 11.00	Plenary Lecture 1: Phùng Hô Hai (Institute of Math, Vietnam Academy of Science and Technology)		Plenary Lecture 3: Marian Roque (University of The Philippines Diliman)		Plenary Lecture 5: Johan Matheus Tuwankotta (Institut Teknologi Bandung)	
11.00 - 11.15						
11.15 - 11.30	Lunch		Contributed Talks C		Contributed Talks F	
11.30 - 12.00						
12.00 -12.15						
12.15 - 12.30			Lunch		Lunch	
12.30 - 13.00						
13.00 - 13.15	Plenary Lecture 2: Maman A. Djauhari (The Bandung Statistical Institute)					
13.15 - 13.30			Contributed Talks D		Contributed Talks G	
13.30 - 13.45		SEAMS Council Meet-ing				
13.45 - 14.00	Contributed Talks A					
14.00 - 14.15						
14.15 - 14.45						
14.45 - 15.00					Closing Session	
15.00 - 15.15						
15.15 - 15.30	Coffee Break		Coffee Break		Coffee Break	
15.30 - 15.45						
15.45 - 16.00	Contributed Talks B		Contributed Talks E			
16.00 - 16.15						
16.15 - 16.30						
16.30 - 16.45						
16.45 - 17.00						
17.00 – 18.00						
18.00 - 18.30						
18.30 - 19.00			Conference Dinner			
19.00 - 19.30						
19.30 - 20.00						
20.00 - 20.30						
20.30 - 21.00						

Contributed Talk A: Friday, 11 August 2017

Time	Room 1	Room 2	Room 3	Room 4
13.50 - 14.10	CT-006	CT-013	CT-003	CT-044
14.10 - 14.30	CT-077	CT-022	CT-050	CT-008
14.30 - 14.50	CT-098	CT-066	CT-076	CT-048
14.50 - 15.10	CT-064	CT-078	CT-029	CT-102

Contributed Talk B: Friday, 11 August 2017

Time	Room 1	Room 2	Room 3	Room 4
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16.05 - 16.25	CT-026	CT-021	CT-053	CT-096
16.25 - 16.45	CT-069	CT-028	CT-084	CT-054

Contributed Talk C: Saturday, 12 August 2017

Time	Room 1	Room 2	Room 3	Room 4
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11.35 - 11.55	CT-030	CT-001	CT-033	CT-107
11.55 - 12.15	CT-063	CT-027	CT-043	CT-039

Contributed Talk D: Saturday, 12 August 2017

Time	Room 1	Room 2	Room 3	Room 4
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13.35 - 13.55	CT-032	CT-004	CT-037	CT-009
13.55 - 14.15	CT-057	CT-060	CT-042	CT-086
14.15 - 14.35	CT-055	CT-015	CT-061	CT-089
14.35 - 14.55	CT-108	CT-067	CT-059	CT-073
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Contributed Talk E: Saturday, 12 August 2017

Time	Room 1	Room 2	Room 3	Room 4
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Contributed Talk F: Sunday, 13 August 2017

Time	Room 1	Room 2	Room 3	Room 4
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14.15 – 14.35	CT-049	CT-082		

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Room I

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13.00 – 13.40	**Monitoring Complex Industrial Process Variability: A Necessary and Sufficient Shewhart-type Control Chart** Maman Djauhari Centre for Research in Statistics and Data Analysis Tjahaja Bina Statistika Indonesia, Ltd. P. (Commanditaire Vennootschap), Indonesia [PL-002]	Agus Yodi Gunawan

August 12 (Sat.)		**Chair**
09.00 – 10.00	**Mathematical Challenge to Understanding of Materials** Motoko Kotani Tohoku University, Japan [KE-001]	Yudi Soeharyadi
10.30 – 11.15	**Half Derivative? An Introduction to Fractional Derivatives and their Applications** Marian P. Roque Institute of Mathematics University of the Philippines Diliman, Philippines [PL-003]	Sri Redjeki Pudjaprasetya

Plenary Lectures & Keynote Speaker

Room I

August 13 (Sun.)		**Chair**
09.15 – 10.00	**Lessons to Learn from Leadings Countries in TIMSS** Aida Suraya Faculty of Educational Studies Universiti Putra Malaysia, Malaysia [PL-004]	Rinovia Simanjuntak
10.30 – 11.15	**Duality in Discrete Integrable Systems** J. M. Tuwankotta Analysis and Geometry Research Division Institut Teknologi Bandung, Indonesia [PL-005]	Agah Garnadi

Contributed Talks A

August 11 (Fri.) **Room: I**
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13.50 – 14.10 **Restricted size Ramsey number for pairs of graphs of order at most four**
Denny Riama Silaban[1*], Edy Tri Baskoro[2], Saladin Uttunggadewa[2]
[1]Universitas Indonesia, Indonesia
[2]Institut Teknologi Bandung, Indonesia [CT-006]

14.10 – 14.30 **On entire face irregularity strength of plane graphs**
Martin Baca[1*], Marcela Lascsakova[1], Maria Naseem[2], Andrea Semanicova-Fenovcikova[1]
[1]Technical University in Kosice, Slovakia
[2]GC University, Lahore, Pakistan [CT-077]

14.30 – 14.50 **Construction of Cospectral K-Uniform Hypergraph**
Galih Pradananta[*], Hanni Garminia
Institut Teknologi Bandung, Indonesia [CT-098]

14.50 – 15.10 **(H1 H2)-supermagic Labelings on Bead(H1 H2 e1 e2)**
Viny Rizkiwati[*], A.N.M. Salman
Institut Teknologi Bandung, Indonesia [CT-064]

Contributed Talks A

August 11 (Fri.) **Room: II**
13.45 – 15.15 Chair: Windarto

13.50 – 14.10 **Stagnation-Point Flow of a Micropolar Fluid on a Permeable Streching or Shrinking Surface of Another Quiescent Fluid**
Nurazleen Abdul Majid[1], Nurul Farahain Mohammad[1*], Abdul Rahman Mohd Kasim[2], Ioan Pop[2]
[1]International Islamic University Malaysia
[2]Universiti Malaysia Pahang
[3]Babeş-Bolyai University [CT-013]

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Shahirah Abu Bakar[*], Norihan Md Arifin, Fadzilah Md Ali, Norfifah Bachok, Roslinda Nazar
Universiti Putra Malaysia [CT-022]

14.30 – 14.50 **Effect Of A Small Insoluble Surfactant Concentration on the Shape of a Steady Sessile Drop: Numerical And Asymptotic Approaches**
Kartika Yulianti[1*], Agus Yodi Gunawan[2]
Universitas Pendidikan Indonesia, Indonesia [CT-066]

14.50 – 15.10 **The Modified Plant Propagation Algorithm for Optimization Problems**
Mutia Nur Estri[1], Siti Rahmah Nurshiam[1], Rina Reorita[1], Muhammad Okky Ibrohim[2*]
[1]Jenderal Soedirman University, Indonesia
[2]Universitas Indonesia, Indonesia [CT-078]

Contributed Talks A

August 11 (Fri.) **Room: III**
13.45 – 15.15 Chair: Nor'Aini Aris

13.50 – 14.10 **Generalized Bi-ideal of Ordered Semigroup Related to Intuitionistic Fuzzy Point**
Hidayat Ullah Khan[1*], Asghar Khan[2], Yongjin Li[3], Azizul Hakeem[1]
[1]University of Malakand, Pakistan
[2]Abdul Wali Khan University Mardan, Pakistan
[3]Sun-Yat-Sen University, China [CT-003]

14.10 – 14.30 **Formal Analysis Using Scyther on SOFU-11 Key Exchange Protocol**
Rizqi Aulia Ashari[*], Mohamad Ali Sadikin, Arif Rahman Hakim
Sekolah Tinggi Sandi Negara [CT-050]

14.30 – 14.50 **Effect of Self-Repetitive Matrix to Polygraphic Cipher Polyfunction Transformation**
Nor Fatin Fatehah Norazmi, Faridah Yunos[*]
Universiti Putra Malaysia , Malaysia [CT-076]

14.50 – 15.10 **Characterization of $(\in, \in \vee q_k)$ fuzzy quasi Γ-ideals in ordered Γ-semigroups**
Ibrahim Gambo[1*], Nor Haniza Sarmin[1,] Hidayat Ullah Khan[2], Faiz Muhammad Khan[2]
[1]Universiti Teknologi Malaysia
[2]University of Malakand, Khyber Pukhtunkhwa, Pakistan [CT-029]

Contributed Talks A

August 11 (Fri.) **Room: IV**
13.45 – 15.15 Chair: Utriweni Mukhaiyar

13.50 – 14.10 **Implementation of GSTAR Kriging Model to Predict Rainfall Data at Unobserved Locations in West Java**
Deltha Airuzsh Lubis[1*], Shailla Rustiana[1], I Gede Nyoman Mindra Jaya[1], Atje Setiawan Abdullah[1], Eddy Hermawan[2], Budi Nurani Ruchjana[1]
[1]Universitas Padjadjaran, Indonesia
[2]Center of Atmospheric Science and Technology, National Institute of Aeronautics and Space Bandung, Indonesia [CT-044]

14.10 – 14.30 **Some Properties of Beta Kumaraswamy Exponential Distribution**
Umar Yusuf Madaki[*], Mohd Rizam Abu Bakar
Universiti Putra Malaysia [CT-008]

14.30 – 14.50 **Forecasting Rainfall Data Using GSTAR-ARCH Model at Some Disaster Prone Areas in West Java**
Shaila Rustiana[1*], Deltha Airuzsh Lubis[1], I Gede Nyoman Mindra Jaya[1], Atje Setiawan Abdullah[1], Eddy Hermawan[2], Budi Nurani Ruchjana[1]
[1]Universitas Padjadjaran, Indonesia
[2]Center of Atmospheric Science and Technology, National Institute of Aeronautics and Space Bandung, Indonesia [CT-048]

14.50 – 15.10 **Modeling High Probability Zeros for Count Data using Zero Inflated Poisson (ZIP) Autoregression with Neighboring Effect**
R. Prathama Surahmat[*], Utriweni Mukhaiyar
Institut Teknologi Bandung, Indonesia [CT-102]

Contributed Talks B

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Debi Oktia Haryeni*, Edy Tri Baskoro, Suhadi Wido Saputro
Institut Teknologi Bandung, Indonesia [CT-007]

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Rabiha Mahmoud[1*], Nor Haniza Sarmin[1], Ahmad Erfanian[2]
[1]Universti Teknologi Malaysia
[2]Ferdowsi University of Mashhad [CT-026]

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Corry Corazon Marzuki*, Fitria Fitria, Nia Gianita, Ramadana Fitri
UIN Suska Riau , Indonesia [CT-069]

Contributed Talks B

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Sri Maryani*, Idha Sihwaningrum, Bambang H Guswanto
UNSOED, Indonesia [CT-023]

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Windiani Erliana*, Agah D. Garnadi, Sri Nurdiati, I Gusti Putu Purnaba
Institut Pertanian Bogor, Indonesia [CT-021]

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Norliza Mohd Zain*, Zuhaila Ismail
Department of Mathematical Sciences, Universiti Teknologi Malaysia [CT-028]

Contributed Talks B

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Etsuo Segawa
Graduate School of Information Sciences, Tohoku University
[CT-041]

16.05 - 16.25 **On unicyclic Ramsey (mK_2,P_4)-minimal graphs**
Kristiana Wijaya[1*], Edy Tri Baskoro[2], Hilda Assiyatun[2]
[1]Jember University, Indonesia
[2]Institut Teknologi Bandung, Indonesia [CT-053]

16.25 - 16.45 **Comparison Analysis of Rainbow Connection Number of $C_m \odot C_n$ and $C_m \odot P_n$ Graphs**
Dian Setyorini[*], Soya Febeauty Yama Otantia Pradini, Alfi Maulani, Kiki A. Sugeng
Universitas Indonesia, Indonesia [CT-084]

Contributed Talks B

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Noor Atinah Ahmad, Muhammad Aminu*
School of Mathematical Sciences, Universiti Sains Malaysia
[CT-016]

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Novriana Sumarti, Muhammad Al Kahfi*
Institut Teknologi Bandung, Indonesia [CT-096]

16.25 - 16.45 **Implementation of Ordinary Co-Kriging Method for Prediction of Coal Mining Variable at Unobserved Locations Using Software R**
Annisa Nur Falah[1*], Nur Hamid[2], Endang Rusyaman[1], Budi Nurani Ruchjana[1]
[1]Department of Mathematics Unversitas Padjadjaran, Indonesia
[2]Faculty of Geological Engineering Universitas Padjadjaran, Indonesia
[CT-054]

Contributed Talks C

August 12 (Sat.) **Room: I**
11.15 – 12.15 Chair: Kristiana Wijaya

11.15 - 11.35 **On size tripartite Ramsey numbers of $mK_{1,n}$ versus C_3**
Anie Lusiani*, Edy Tri Baskoro, Suhadi Wido Saputro
Combinatorial Mathematics Research Group, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Indonesia [CT-025]

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Amira Fadina Ahmad Fadzil*, Nor Haniza Sarmin, Rabiha Mahmoud
Universiti Teknologi Malaysia [CT-030]

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Bety Hayat Susanti*, A.N.M. Salman, Rinovia Simanjuntak
Institut Teknologi Bandung, Indonesia [CT-063]

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Nurul Shahirah Mohd Adnan[1*], Norihan Md Arifin[2], Norfifah Bachok[2], Fadzilah Md Ali[2]
[1]INSPEM, Universiti Putra Malaysia, Malaysia
[2]Universiti Putra Malaysia, Malaysia [CT-024]

11.35 - 11.55 **Numerical Simulation of Two Dimensional Partial Differential Equations by Bernstein Polynomial Differential Quadrature Method**
Rajni Rohila[*], R. C. Mittal
IIT Roorkee, India [CT-001]

11.55 - 12.15 **Radiation Effect on MHD Ferrofluid flow with Ramped Wall Temperature and Arbitrary Wall Shear Stress**
Ahmad Qushairi Mohamad[1*], Nor Athirah Mohd Zin[1], Aaiza Gul[2], Imran Ullah[1], Sharena Mohamad Isa[1], Arshad Khan[3], Sharidan Shafie[1]
[1]Universiti Teknologi Malaysia, Malaysia
[2]SIIT Thammasat University
[3]Sarhad University of Science and IT Peshawar [CT-027]

Contributed Talks C

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Jose Maria Balmaceda*, Joris Buloron
University of the Philippines Diliman, Philippines [CT-097]

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Rizqi Aulia Ashari*, Gayuh Ajeng Bestari, Mohamad Ali Sadikin, Annisa Dini Handayani
Sekolah Tinggi Sandi Negara [CT-033]

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Shamsatun Nahar Ahmad[1*], Nor'Aini Aris[2]
[1]Universiti Teknologi MARA, Malaysia
[2]Universiti Teknologi Malaysia, Malaysia [CT-043]

Contributed Talks C

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Atje Setiawan Abdullah[1*], Yopi Andry Lesnussa[2], Francis Yunito Rumlawang[2], Budi Nurani Ruchjana[3]
[1]Department of Computer Science Universitas Padjadjaran, Indonesia
[2]Department of Mathematics Universitas Pattimura, Indonesia
[3]Department of Mathematics Universitas Padjadjaran [CT-092]

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Ni Luh Putu Asri Cahyani[*], Utriweni Mukhaiyar
Institut Teknologi Bandung, Indonesia [CT-107]

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Yudhie Andriyana[*], Bertho Tantular, I Gd. Nyoman Mindra Jaya
Statistics Department, Universitas Padjadjaran [CT-039]

Contributed Talks D

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Budi Rahadjeng*, Edy Tri Baskoro, Hilda Assiyatun
Institut Teknologi Bandung, Indonesia [CT-019]

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Yusuke Yoshie[1*], Etsuo Segawa[1], Tetsuji Taniguchi[2], Sho Kubota[1]
[1]Tohoku University, Japan
[2]Hiroshima Institute of Technology, Japan [CT-032]

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Yusuf Hafidh*, Edy Tri Baskoro
Institut Teknologi Bandung, Indonesia [CT-057]

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Debbie Angelia Susanti*, Suhadi Wido Saputro
Institut Teknologi Bandung, Indonesia [CT-055]

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Ali Ahmad
College of Computer Science & Information Systems,
Jazan University, Jazan, KSA [CT-108]

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Pol Llagostera Blasco
University of Lleida (UdL), Lleida, Spain [CT-106]

Contributed Talks D

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13.15 – 15.15 Chair: Nurul Farahain Mohammad

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Nurul Syuhada Ismail*, Norihan Md Arifin, Roslinda Nazar, Norfifah Bachok
Universiti Putra Malaysia, Malaysia [CT-034]

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Ikhsan Maulidi[1*], Agah Garnadi[2]
[1]Institut Teknolofi Sumatera, Indonesia
[2]Institut Pertanian Bogor, Indonesia [CT-004]

13.55 - 14.15 **On Broyden-Like Simplified Iteratively Regularized Gauss-Newton Method**
Agah D. Garnadi
Institut Pertanian Bogor, Indonesia [CT-060]

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Yeou Jiann Lim[1*], Ahmad Qushairi Mohamad[1], Abdul Rahman Mohd Kasim[2], Sharidan Shafie[1]
[1]Universiti Teknologi Malaysia
[2]Universiti Pahang Malaysia [CT-015]

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Normazni Abdullah*, Zuhaila Ismail
Universiti Teknologi Malaysia, Malaysia [CT-067]

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Yoke Teng Toh*, Chang Phang
Universiti Tun Hussein Onn Malaysia, Malaysia [CT-088]

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13.15 - 13.35 **Effects of Playing Computer Games on Primary School Students' Performance in Solving Routine and Non-Routine Mathematical Problems**
Rosnaini Mahmud*, Yusri Abdullah, Habibah Ab Jalil, Shaffe Mohd Daud
Universiti Putra Malaysia, Malaysia [CT-005]

13.35 - 13.55 **Students Mathematization Ability in The Implementation of Generative Learning Model**
Eka Firmansyah
Universitas Pendidikan Indonesia, Indonesia [CT-037]

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Tatang Supriatnna[1*], Ine Sukartini[2]
[1]Universitas Pendidikan Indonesia, Mathematics Education Departement, Indonesia
[2]SMK PGRI 2 Sumedang,Jl Angkrek No 99 Sumedang, Jawa Barat Indonesia [CT-042]

14.15 - 14.35 **User context in learning mathematics online: Coding Theory and Discrete Algebra**
Putranto Hadi Utomo[1*], Ruud Pellikaan[2], Jan Willem Knopper[2]
[1]University of Technology and Sebelas Maret University, Indonesia
[2]Eindhoven University of Technology, Netherlands [CT-061]

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Saint Louis University, Philippines [CT-059]

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Adilan Widyawan Mahdiyasa, Anung Grahito
Institut Teknologi Bandung, Indonesia [CT-100]

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Umar Yusuf Madaki*, Mohd Rizam Abu Bakar
Universiti Putra Malaysia [CT-009]

13.55 - 14.15 **Effect of Trimmed Data in Parameter Estimation of Some Growth Models**
Windarto*, Eridani, Utami Dyah Purwati
Universitas Airlangga, Indonesia [CT-086]

14.15 - 14.35 **Smoothing Splines, B-Splines and P-Splines Approach to Modeling Per Capita Gross Regional Domestic Product and Human Development Index of Indonesia 2015**
Dina Prariesa, Yudhie Andriyana
Universitas Padjadjaran, Indonesia [CT-089]

14.35 - 14.55 **Modeling The Number of Occurrences of Rainfall in Bandung Regency by Means Integrated Nested Laplace Approximation**
I Gede Nyoman Mindra Jaya[1*], Budi Nurani Ruchjana[1], Atje Setiawan Abdullah[1], Edi Hermawan[2]
[1]Universitas Padjadjaran, Indonesia
[2]Indonesian Aeronautics and Space Agency [CT-073]

14.55 - 15.15 **Improving Backpropagation Algorithm Using Parameter Optimization and Curve Smoothing for Stock Prices Prediction**
M. Rizki Oktavian*, Utriweni Mukhaiyar
Institut Teknologi Bandung, Indonesia [CT-103]

Contributed Talks E

August 12 (Sat.) **Room: I**

15.45 – 16.45 Chair: Rismawati Ramdani

15.45 - 16.05 **Ramsey minimal graphs for P4 versus Pn**

Desi Rahmadani*, Edy Tri Baskoro, Hilda Assiyatun
Combinatorial Mathematics Research Group Faculty of Mathematics and Natural Sciences Institut Teknologi Bandung-Indonesia [CT-014]

16.05 - 16.25 **On Graceful Trees and Beyond**

Tao-Ming Wang
Department of Applied Mathematics, Tunghai University, Taichung, Taiwan [CT-104]

16.25 - 16.45 **The upper bound of partition dimension of the connected two graphs by a bridge**

Amrullah*, Syahrul Azmi
Mataram University, Indonesia [CT-071]

Contributed Talks E

August 12 (Sat.) **Room: II**
15.45 – 16.45 Chair: Windarto

15.45 - 16.05 **Mixed Convection Flow of Second Grade Nanofluid in Presence of Gravity Modulation Over an Inclined Stretching Sheet**
Noraihan Afiqah Rawi[1*], Mohd Rijal Ilias[2], Zaiton Mat Isa[3], Sharidan Shafie[3]
[1]Department of Mathematical Sciences, UTMJB, Malaysia
[2]Universiti Teknologi MARA, Malaysia
[3]Universiti Teknologi Malaysia, Malaysia [CT-017]

16.05 - 16.25 **Numerical model for wave generation by bottom motion to understand tsunami phenomena**
Sugih Sudharma Tjandra
Industrial Engineering Parahyangan Catholic University, Indonesia [CT-081]

16.25 - 16.45 **Unsteady MHD Free Convection Flow of Casson-Nanofluid Over an Oscillating Vertical Plate with Newtonian Heating**
Asma Khalid[1], Sharidan Shafie[2*]
[1]SBK Women's University, Pakistan
[2]Universiti Teknologi Malaysia, Malaysia [CT-079]

Contributed Talks E

August 12 (Sat.) **Room: III**
15.45 – 16.45 Chair: Gantina Rachmaputri

15.45 - 16.05 **Efficient Alternative Method for Computing Multivariate Resultant**
Surajo Sulaiman[1], Nor'Aini Aris[1*], Shamsatun Nahar Ahmad[2]
[1]Universiti Teknologi Malaysia 81310 UTM Johor Bahru, Johor, Malaysia
[2]Universiti Teknologi MARA, Malaysia [CT-020]

16.05 - 16.25 **Analysis Using BAN Logic and Syther on Asokan-Ginzboorg Key Agreement Protocol**
Gayuh Ajeng Bestari[*], Mohamad Ali Sadikin, Arif Rahman Hakim
Sekolah Tinggi Sandi Negara, Indonesia [CT-052]

16.25 - 16.45 **Measurement Algebra of Complementary Observables for Dimensions Two to Five**
Siti Aqilah Muhamad Rasat[*], Hishamuddin Zainuddin
Institute For Mathematical Research (INSPEM), Universiti Putra Malaysia, Malaysia [CT-035]

Contributed Talks E

August 12 (Sat.) **Room: IV**
15.45 – 16.45 Chair: Prathama Surahmat

15.45 - 16.05 **Fuzzy Time Series Forecasting using Sliding Window Method**
Nur Fazliana Rahim*, Mahmod Othman, Radzuan Razali
Universiti Teknologi PETRONAS, Malaysia [CT-018]

16.05 - 16.25 **Solving the Robust Counterpart of Uncertain Linear Optimization Problems with Binary Variables**
Diah Chaerani*, Erick Paulus, Eman Lesmana, Endang Rusyaman
Universitas Padjajaran, Indonesia [CT-010]

16.25 - 16.45 **Estimating Heterogeneous Coefficients in Panel Data Model by Means Bayesian Approach**
I Gede Nyoman Mindra Jaya*, Yudhie Andriyana, Zulhanif Zulhanif, Bertho Tantular
Universitas Padjadjaran, Indonesia [CT-047]

Contributed Talks F

August 13 (Sun.) **Room: I**

11.15 – 12.15 Chair: Pol Llagostera Blasco

11.15 - 11.35 **On the Vertex Irregular Total Labeling for Subdivision of Trees**

Susilawati Nurdin[1*], Edy Tri Baskoro[1], Rinovia Simanjuntak[1], Joe Ryan[2]
[1]Institut Teknologi Bandung, Indonesia
[2]The University of Newcastle, Australia [CT-038]

11.35 - 11.55 **The $L(2,1)$-Labeling Number of Corona Product of K_1 and Some Certain Graphs**

Rismawati Ramdani
UIN Sunan Gunung Djati Bandung [CT-090]

11.55 - 12.15 **On TIASL of Star Graphs**

H. M. Radiapradana, Suhadi Wido Saputro, Erma Suwastika[*], Oki Neswan, Andrea Semanicova-Fenovcikova
[1]Institut Teknologi Bandung, Indonesia
[2]Technical University of Kosice, Slovakia [CT-068]

Contributed Talks F

August 13 (Sun.) **Room: II**

11.15 – 12.15 Chair: Prama Setia Putra

11.15 - 11.35	**Numerical solution for a class of fractional optimal control problem via second order B-spline function** Noratiqah Farhana Ismail*, Chang Phang Universiti tun hussein onn malaysia (UTHM), Malaysia	[CT-040]
11.35 - 11.55	**Solving Variable-order Fractional Partial Differential Equations Using Genocchi Wavelets-like Method** Afshan Kanwal, Chang Phang* Universiti Tun Hussein Onn Malaysia, Malaysia	[CT-093]
11.55 - 12.15	**OpenMP Platform for Accelerating Computational Simulation Time of Multi-layer Shallow Water Equations** Putu Harry Gunawan School of Computing Telkom University, Indonesia	[CT-062]

Contributed Talks F

August 13 (Sun.) **Room: III**
11.15 – 12.15 Chair: Afif Humam

11.15 - 11.35 **SAKA-HM: A Secure Server-based Key Transport Protocol Based on Event Markers**
Dea Saka Kurnia Putra*, Annisa Dini Handayani
Sekolah Tinggi Sandi Negara
[CT-056]

11.35 - 11.55 **Multiplication Semimodules Over Fully Prime Semiring**
Andi Muhammad Anwar*, Irawati, Hanni Garminia
Institut Teknologi Bandung, Indonesia [CT-085]

11.55 - 12.15 **Distance Magic Labeling Using Algebraic Approach**
Palton Anuwiksa*, Rinovia Simanjuntak
Institut Teknologi Bandung, Indonesia [CT-101]

Contributed Talks F

August 13 (Sun.) **Room: IV**

11.15 – 12.15 Chair: Debi Oktia Haryeni

11.15 - 11.35 **The strong 3-rainbow index of amalgamation of fans and shackle of fans**
Zata Yumni Awanis*, A.N.M. Salman
Institut Teknologi Bandung, Indonesia [CT-046]

11.35 - 11.55 **The Total Irregularity Strength of a Complete Bipartite Graph: A Completion**
Meilin Tilukay*, A.N.M. Salman
Institut Teknologi Bandung, Indonesia [CT-087]

11.55 - 12.15 **The Metric Dimension and The Partition Dimension of Circulant Graphs**
Tomáš Vetrík
Department of Mathematics and Applied Mathematics,
University of the Free State, Bloemfontein, South Africa [CT-105]

Contributed Talks G

August 13 (Sun.) **Room: I**

13.15 – 14.15 Chair: Tomáš Vetrík

13.15 – 13.35 **Open Neighborhood Locating-dominating Set in Mycielski Graph**
Wedyata Larasartika*, Suhadi Wido Saputro
Institut Teknologi Bandung, Indonesia [CT-045]

13.35 – 13.55 **Root Square Mean Labeling of Some Splitting Graphs**
Rismawati Ramdani
UIN Sunan Gunung Djati Bandung, Indonesia [CT-091]

13.55 – 14.15 **The Strong 3-Rainbow Index of Comb Product of Some Graphs**
Dinda Kartika*, A.N.M. Salman
Institut Teknologi Bandung, Indonesia [CT-058]

14.15 – 14.35 **Geodetic Domination in Mycielski Graphs**
Muhammad Sukma Alam*, Suhadi Wido Saputro
Institut Teknologi Bandung, Indonesia [CT-049]

Contributed Talks G

August 13 (Sun.) **Room: II**
13.15 – 14.35 Chair: Putu Harry Gunawan

13.15 – 13.35 **Numerical Simulation of Blood Flow in a 3D Bifurcated Artery with Different Geometry of Stenosis**
Sabaruddin Ahmad Jamali*, Zuhaila Ismail
Universiti Teknologi Malaysia, Malaysia [CT-070]

13.35 – 13.55 **Bogdanov Taken Bifurcation Analysis in A Predator-Prey Model with Logistic Growth using MATCONT**
Fazilah Ahmad[1*], Noor Atinah Ahmad[2], Mohd Hafiz Mohd[2]
[1]Cyberjaya University College of Medical Sciences, Malaysia
[2]Universiti Sains Malaysia, Malaysia [CT-094]

13.55 – 14.15 **Design of Diagnostic Disease System Using Support Vector Machine (SVM) Method, Artificial Neural Network Backpropagation And Learning Vector Quantization (LVQ)**
Yopi Lesnussa, Zeth Leleury*, Johan Bension
Pattimura University, Indonesia [CT-080]

14.15 – 14.35 **Portfolio Optimization in Mean Variance and Variance with Skewness Risk Measures Using Spiral Optimization Method**
Wina Novitasari*, Kuntjoro Adji Sidarto
Institut Teknologi Bandung, Indonesia [CT-082]

Contributed Talks G

August 13 (Sun.) **Room: III**

13.15 – 14.15 Chair: Etsuo Segawa

13.15 – 13.35 **An Algorithm to Construct New Optimal Z2Z4-Additive Cyclic Code**
Felita Ariella Mustika*, Djoko Suprijanto
Institut Teknologi Bandung, Indonesia [CT-051]

13.35 – 13.55 **Linear Approximation on 5-rounds SIMECK-32 Algorithm**
Javalina Harsari*, Santi Indarjani
Sekolah Tinggi Sandi Negara, Indonesia [CT-075]

13.55 – 14.15 **Efficient Algorithm to Test and Search Primitive Elements in Elliptic Curve Cryptography**
Mohammad Heading Nor Ilahi*, Annisa Dini Handayani
Sekolah Tinggi Sandi Negara (National Crypto Institute), Indonesia [CT-012]

Contributed Talks G

August 13 (Sun.) **Room: IV**
13.15 – 14.15 Chair: Erma Suwastika

13.15 – 13.35 **Distance Antimagic Labeling of Graph Products**
Aholiab Tritama*, Rinovia Simanjuntak
Institut Teknologi Bandung, Indonesia [CT-099]

13.35 – 13.55 **Impossible Diferential Characteristic On Modified (Nonundisturbed bit) PRESENT**
Caesario Oktanto Kisty*, Sri Rosdiana
Sekolah Tinggi Sandi Negara, Indonesia [CT-031]

13.55 – 14.15 (H_1, H_2)**–Supermagic labelings on certain shackles of connected graphs** H_1 **and** H_2 **** $shack(H_1, H_2, k)$
Yeva Fadhilah Ashari*, A.N.M. Salman
Institut Teknologi Bandung, Indonesia [CT-065]

KE – 001

Mathematical Challenge to Understanding of Materials

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AIMR challenges to establish a basis of predicting properties/functions of materials by mathematics-materials science collaboration. Three target projects "non- equilibrium materials based on mathematical dynamical system", "Topological functional materials", "Multi-scale hierarchical materials based on discrete geometric analysis" are set up. I would like to discuss some emerging results in the projects.

PL – 001

The Differential Galois Group of One Parametric Systems of Linear Differential Equations

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Joint work with Nguyen Dai Duong and Joao Pedro dos Santos

On a projective complex manifold X, the Riemann-Hilbert correspondence associates to a system of linear differential equations on X a representation of the topological fundamental group of X (at a fixed base point), called the monodromy representation. The image of this representation is called the monodromy group of the system. By Serre's GAGA principle, this correspondence can be constructed in a pure algebraic way for smooth projective schemes over the complex numbers. The algebraic analog of the monodromy group is the differential Galois group, defined by applying Tannakian duality to the tensor abelian category of all systems of linear differential equations on X (i.e. the category of flat connections on X). The construction is further developed for proper smooth schemes in positive characteristic, in which flat connections are replaced by stratified bundles. The study of the differential Galois groups has attracted attention of many authors since more than 40 years. Most notable is the Grothendieck-Katz p-curvature conjecture.

The aim of our work is to study the differential Galois group of an infinitesimal one-parametric family of proper schemes. Thus let X be a proper scheme upon $S = SpecR$, where R is a complete discrete valuation ring. Our approach is to utilize Tannakian duality to construct the differential Galois group as an affine flat group scheme over R. We study this group scheme and deduce from it some information about the family of systems of differential equations.

PL – 002

Monitoring Complex Industrial Process Variability: A Necessary and Sufficient Shewhart-type Control Chart

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In the current practice of complex process variability monitoring, the most adopted control chart is lacking of sufficiency. It is only a necessary control chart (N-chart). Thus, this chart might be misleading. This paper is to overcome this problem. For this purpose, a statistic that leads to a necessary and sufficient control chart (NS-chart) is introduced. To make it practical, its limiting distributional behavior is investigated and to illustrate its advantages, an industrial example is presented.

Keywords: Commutation matrix; Mahalanobis distance; multivariate dispersion; multivariate statistical process control; vec operator

PL – 003

Half Derivative? An Introduction to Fractional Derivatives and their Applications

Marian P. Roque
Institute of Mathematics
University of the Philippines Diliman

Fractional calculus is a discipline of mathematical analysis dealing with derivatives and integrals of nonintegral order. It started as a purely theoretical field but has recently become a relevant tool in the modelling of physical phenomena. In this talk, I shall give some properties of some fractional derivatives which may or may not hold for classical derivatives. In particular, the Riemann-Liouville fractional derivative(RLFD), Caputo fractional derivative(CFD), and the Caputo-Fabrizio fractional derivative (CFFD) will be discussed. Fractional solutions of some mathematical models will be derived and compared with the classical solution of the model.

Keywords: Riemann-Liouville Fractional Derivative, Caputo Fractional Derivative, Caputo-Fabrizio Fractional Derivative

PL – 004

Lessons to Learn from Leadings Countries in TIMSS

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This presentation highlights on Malaysian and Indonesian students' performance in Trends in Mathematics and Science Study (TIMSS) 2011 and 2015. Tops countries for TIMSS 2015 for both 10 year olds and 14 year olds are Singapore, Korea, Hong Kong, Chinese Taipei and Japan. The results show that both Malaysian and Indonesian students are not able to perform tasks that require higher order thinking skills. Slight improvement shown over the years may be due to proper strategizing of both nations in preparing students for TIMSS. Several resources are used to identify common and unique factors that may contribute to the success of students in these TIMSS leading countries. It may provide some insights on how we need to shape the teaching and learning of mathematics in our countries.

PL – 005

Duality in Discrete Integrable Systems

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Discrete dynamical systems arises quite naturally in applications, for example being an approximation for Systems of Ordinary of Partial Differential equations. The theory however, is far less well understood in comparison with the continuous cases. Integrability, on the other hand is also a well defined and rather fully understood concept in Systems of Ordinary Differential Equations (but not so much in Partial Differential Equations). In the discrete cases, the situation is more or less comparable.

One might argue that Integrable Systems are not so many in compare with the nonintegrable systems, or even less exciting due to the discoverey and the development of the Theory of Chaos in 1960s. However, integrable systems is mathematically interesting due its richness in structures. Moreover, it serves as a very good approximation for the more exciting nonintegrable systems and most of the time, it can give insight to underlaying complex mechanism that is found in the nonitegrable systems.

The year of 1988 and 1989, two papers are published describing a two dimensonal rational maps depends on 18 parameters, the celebrated Quispel-Roberts-Thompson (QRT) map (from La Trobe University, University New South Wales, and Australian National University respectively). This turns out to be one of the most general integrable system in two dimension (arguably the most general). In 2010, the late J.J. Duistermaat (Utrecht Univesity) published a seminal book with the title Discrete Integrable Systems: QRT Maps and Elliptic Surfaces, where various different angle and approaches have been considered in understanding the QRT maps.

In this talk, we will try to uncovered a relatively new concept in Discrete Integrable Systems which is Duality. This concept is introduced by G.R.W. Quispel (La Trobe Univesity) in 2005, for a discrete dynamical system defined by a single equation. This concept is easily generalized to discrete dynamical systems defined by a system of equations, however the procedure of getting the duals is far from trivial extension of the known one. We generalize this method, and propose a different, rather more straight forward, approach for computing the duals.

CT – 001

Numerical Simulation of Two Dimensional Partial Differential Equations by Bernstein Polynomial Differential Quadrature Method

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We propose a numerical method using Bernstein polynomials for finding numerical solutions of two dimensional nonlinear partial differential equations arising in various areas of science and engineering. In differential quadrature method, we approximate derivatives of the function by a linear sum of functional values at the nodes of the given domain. Weighting coefficients have been determined by taking Bernstein polynomials as base functions. Application of differential quadrature method to the partial differential equation gives a system of ODE's which have been solved by strong stability preserving Runge-Kutta (SSPRK-43) method. To validate the scheme, method has been applied on some well known two dimensional problems. Obtained results confirm the accuracy of the method.

2010 Mathematics Subject Classification: 65Mxx, 65Yxx
Keywords: Differential Quadrature Method, Bernstein Polynomial, Brusselator system, Burgers' equation

CT – 003

Generalized Bi-ideal of Ordered Semigroup Related to Intuitionistic Fuzzy Point

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Azizul Hakeem, ADepartment of Mathematics, University of Malakand, Chakdara, Dir (L), Khyber Pakhtunkhwa, Pakistan, hidayatullak@yahoo.com

Intuitionistic fuzzy generalizd bi-ideals play an important role in the study of ordered semigroups. In this paper, we try obtain more general form of intuitionistic fuzzy generalizd bi-ideal of an ordered semigroup. The concept of $(\in, \in \vee q_k)$-intuitionistic fuzzy generalizd bi-ideal is introduced and several related properties are investigated. We show that in regular and left weakly regular ordered semigroups the concepts of $(\in, \in \vee q_k)$-intuitionistic fuzzy generalizd bi-ideal and $(\in, \in \vee q_k)$-intuitionistic fuzzy bi-ideal coincide.

2010 Mathematics Subject Classification: 06F05; 20M12; 08A72.
Keywords: Intuitionistic fuzzy bi-ideal; $(\in, \in \vee q_k)$-intuitionistic fuzzy bi-ideal; $(\in, \in \vee q_k)$-intuitionistic fuzzy generalizd bi-ideals; regular ordered semigroups; left weakly regular ordered semigroups.

CT – 004

Inclusion Problem with Polynomial Data

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Agah D. Garnadi, Bogor Agricultural University, agah.garnadi @gmail.com

In this paper, we studied inclusion problem with polynomials data in $\mathbb{R}^3$. We provided a Theorem that guaranted the solution of this problem. Moreover, by using standard potential theory, we approached the solution by using Green's Theorem.

2010 Mathematics Subject Classification: xxx.
Keywords: inclusion problem, polynomial data, potential theory, Green's Theorem.

CT – 005

Effects of Playing Computer Games on Primary School Students Performance in Solving Routine and Non-routine Mathematical Problems

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Literature has provided evidence that playing educational computer games specifically Mathematics led to improved performance in Maths tests, promote creativity and interaction and foster more positive attitude among students. However, not much investigation has been conducted in exploring the effects of different types of computer games on students problem solving skills. Hence, three types of computer games, namely (a) drill, (b) routine problem solving and (c) non-routine problem solving were developed based on sound theories of learning, instructional design and computer game design models. A quasi experimental pretest and posttest design was used to test and compare the effects of the computer games on students problem solving performance in learning the topic on Fraction. Three groups of students aged 10 years old (n=107) were randomly assigned to Experimental Group 1 (EG1), Experimental Group 2 (EG2) and Control Group (CG). The EG1 students were exposed to playing computer games for routine problem solving, and the EG2 students were assigned to playing computer games for non-routine problem solving, while the CG played the drill-based type computer game for the duration of 15 sessions (15 hours). Two sets of instruments were used in this study namely the Fraction Test and a rubric sheet for identifying problem solving phases. Data were analyzed descriptively and inferentially using paired-sampled t-test, ANOVA and

ANCOVA. The findings indicated that there was a significant effect of type of computer game in the routine problem-solving performances (F (2,105) = 11.67; p < 0.05) and in the non-routine problem-solving performances (F (2,105) = 89.78; p < 0.05) where the EG2 outperformed EG1 and CG. Based on the pair-wise comparisons, for the routine problem-solving performance, there was a significant difference between EG2-EG1, and between EG1-CG. These results indicated that EG2-EG1 gained similar effects on routine problem solving performance. For the non-routine problem solving performances, there was a significant difference between EG2-EG1 and EG2-CG. From these findings, it can be concluded that well-designed educational computer games can be used to teach students learn to solve non-routine problems.

2010 Mathematics Subject Classification: xxx.
Keywords: Computer Games, Problem Solving, Routine and Non-Routine Problems.

CT – 006

Restricted Size Ramsey Number for Pairs of Graphs of Order At Most Four

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Let G and H be simple graphs. The Ramsey number $r(G,H)$ for a pair of graphs G and H is the smallest number r such that any red-blue coloring of the edges of K_r contains a red subgraph G or a blue subgraph H. The size Ramsey number $\hat{r}(G,H)$ for a pair of graphs G and H is the smallest number $\hat{r}$ such that there exists a graph F with size $\hat{r}$ satisfying the property that any red-blue coloring of the edges of F contains a red subgraph G or a blue subgraph H. Additionally, if the order of F in the size Ramsey number equals $r(G,H)$, then it is called the restricted size Ramsey number. In 1983, Harary and Miller started to find the (restricted) size Ramsey numbers for pairs of small graphs with orders at most four. Faudree and Sheehan (1983) continued Harary and Miller's works and summarized the complete results on the (restricted) size Ramsey numbers for pairs of small graphs with orders at most four. In 1998, Lortz and Mengenser gave both the size Ramsey numbers and the restricted size Ramsey numbers for pairs of small forests with orders at most five. Recently, we gave the restricted size Ramsey number for a path of order three versus any connected graph of order five and the restricted size Ramsey number for $2K_2$ versus a graph without isolates of order five. In this paper, we continue our research on the (restricted) size Ramsey number involving small graphs by completing the above results for the restricted size Ramsey number for any pair of graphs of order at most four.
2010 Mathematics Subject Classification: 05C55, 05D10, 05C38
Keywords: restricted size Ramsey number, size Ramsey number, small graph

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CT – 007

Partition Dimension of Disjoint Union of Complete Bipartite Graphs

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The idea of resolvability and location in graph were described independently by Slater in 1975 and Harary & Melter in 1976, to establish the same structure in a graph. This concept is then known as the metric dimension of a graph. Chartrand *et al.* in 1998 introduced the partition dimension parameter to possibly gain insight into metric dimension. Recently in 2015, Haryeni *et al.* generalized the definition of the partition dimension of a graph such that it can be also applied to disconnected graphs.

For any (not necessary connected) graph $G(V, E)$ and $A \subset V(G)$, the distance from a vertex $x \in V(G)$ and A, denoted by $d(x, A)$, is $\min\{d(x, a) : a \in A\}$. If $d(x, A) \neq d(y, A)$, then we say A resolves two vertices $x, y \in V(G)$. For an ordered partition $\Lambda = \{A_1, A_2, \ldots, A_k\}$ of $V(G)$, if all $d(x, A_i) < \infty$ for all $x \in V(G)$, then define the representation of x under Λ as $(d(x, A_1), d(x, A_2), \ldots, d(x, A_k))$, and denoted by $r(x|\Lambda)$. A partition Λ is a resolving partition of G if every two distinct vertices $x, y \in V(G)$ are resolved by some A_i, or in short $d(x, A_i) \neq d(y, A_i)$ for some $i \in [1, k]$. The smallest cardinality of a resolving partition Λ in G is called a partition dimension of G. We use the notation $pd(G)$ (or $pdd(G)$ respectively) for the partition dimension of connected (or disconnected) G. If G having no resolving k-partition, then define $pdd(G) = \infty$.

For the disconnected graphs G, many results in determining $pdd(G)$ have been obtained such as for linear forest mP_n and $\bigcup_{i=1}^{t} P_{n_i}$, for star and double star forest $\bigcup_{i=1}^{t} K_{1,n_i}$ and $mT(r, s)$. There were also some results on the partition dimension of a disjoint union of cycles. In this paper, we determine the partition dimension of a disjoint union of complete bipartite graph $tK_{m,n}$ where $m \geq n \geq 2$ and $\bigcup_{i=1}^{t} K_{m,n_i}$ where $m > n_i \geq$ for any integer $t \geq 1$.

2010 Mathematics Subject Classification: 05C12; 05C15.
Keywords: Resolvability, metric dimension, partition dimension, disconnected graph, forest, complete bipartite graph.

CT – 008

Some Properties of Beta Kumaraswamy Exponential Distribution

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We proposed a so-called beta Kumaraswamy exponential distribution which also gives the modification of the beta Kumaraswamy-G family of distribution. Some properties of this proposed model were provided, like: the expansion of densities and quantile function. We considered the Bayes and maximum likelihood methods to estimate the parameters and also simulate the model parameters to validate the methods based on different set of true values. Some real datasets were employed to show the usefulness and flexibility of the model which serves as generalization to many sub-models in the fields of engineering, medical, survival and reliability analysis.

2010 Mathematics Subject Classification: xxx.
Keywords: Bayes estimation, beta Kumaraswamy-G, exponential, quantile function, maximum likelihood estimation, inverse CDF method of simulation.

CT – 009

A Bayesian Parameter Estimation Of Cure Models Based On The Burr Type X Distribution with Censored data

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In this paper we proposed a methodology based on the Burr Type X distributions in the presence of cure fraction, censored data and covariates. Two models are explored here which are the mixture and non-mixture cure fraction models. Inferences for the proposed models are obtained under the Bayesian approach, where the estimates were obtained by using Markov Chain Monte Carlo (MCMC) methods in the presence of covariates and not covariates considering HIV/AIDS clinical data and assume a suitable regression models by incorporating the covariates and a model comparison was check based on the two cure models for the good fit using the criterions. A simulation study was done to validate the results respectively.

2010 Mathematics Subject Classification: xxx.
Keywords: Bayesian analysis, Burr Type X distribution, censored data, mixture model, non-mixture model, Burr Type X distribution.

CT – 010

Solving the Robust Counterpart of Uncertain Linear Optimization Problems with Binary Variables

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Optimization under uncertainty refers to the branch of optimization where the data of the underlying problem is uncertain. This means that the data is not known exactly at the time when the problem has to be solved. The uncertainty may be due to measurement or modelling errors of simply to the unavailability of the required information at the time of the decision. In this paper, we investigate linear optimization problems with uncertainty in the objective vector alone. In this case, several questions arise such as how can we solve the robust counterpart of an uncertain linear optimization problem if binary variables occurs in the problem. To this end, we propose to reformulate the case of the robust counterpart model contains binary variables via a further elaboration of semidefinite relaxation. This can be done by changing the binary variables to $\{-1, 1\}$ variables and represent the objective function and the conic constraints of the problem as a dyadic matrix.. We then obtain a semidefinite formulation whose optimal value is a lower bound for the optimal value of the concerned binary conic quadratic problem. Furthermore, we scale the size of the uncertainty set by a nonnegative parameter, thus we need to answer how does the objective value behave subject to this parameter. In this paper, we also discuss a study of parametric and sensitivity analysis for robust linear optimization is performed.

2010 Mathematics Subject Classification: 90C05, 90C10,90C22, 90C25, 90C30, 90C31
Keywords: robust optimization, robust counterpart, uncertainty set, robust linear optimization, semidefinite relaxation, binary variables, parametric uncertainty

CT – 012

Efficient Algorithm to Test and Search Primitive Elements in Elliptic Curve Cryptography

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Groups are important element in public key cryptography. There are several types of groups that can be used in public key cryptography, one of them is group of points on elliptic curve (EC) referred to Elliptic Curve Cryptography (ECC). The security of this group relies on discrete logarithm problem. With shorter key size, ECC provides the same level of security as RSA or other discrete logarithm system. Many public key cryptographic scheme whose their

security relies on discrete logarithm problem on integer can be modified to discrete logarithm problem on ECC, such as ElGamal, Diffie Hellman, etc. One problem when transform discrete logarithm problem on integer to ECC is to determine primitive element of Group of points on EC. We can evaluate each point of EC whether generate all other point, but it takes long time and hard computation. In this paper we describe an efficient algorithm to evaluate each point of group of point on EC whether is primitive element or not. In addition, this algorithm also can be used to find all the primitive elements on group of points on EC.

2010 Mathematics Subject Classification: Cryptography.
Keywords: Group, primitive element, discrete logarithm problem, public key cryptography, elliptic curve cryptography.

CT – 013

Stagnation-Point Flow of a Micropolar Fluid on a Permeable Stretching or Shrinking Surface of Another Quiescent Fluid

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Micropolar fluid is a non-Newtonian fluid that has microstructure elements. Due to potential applications of permeable stretching or shrinking surface in real life such as blood animal, liquid crystal and a particle suspension, the problem of micropolar fluid is extended to the stagnation-point flow of a micropolar fluid on a permeable stretching or shrinking surface of another quiescent fluid. The objectives of this study are to solve the specific mathematical model of stagnation-point flow of a micropolar fluid on a permeable stretching or shrinking surface of another quiescent fluid numerically and to analyze the characteristics of micropolar fluid under presence of another quiescent fluid which are the velocity profiles, skin friction and microrotation.

Consider an incompressible micropolar fluid of density ρ_1, dynamic viscosity μ_1, vortex viscosityκ_1, spin-gradient viscosity $\gamma_1$and microinertia density j_1 impinging orthogonally on a permeable stretching or shrinking surface of another quiescent, heavier incompressible micropolar fluid of density ρ_2, dynamic viscosity μ_2, vortex viscosity κ_2, spin-gradient viscosity γ_2 and microinertia density j_2. A sketch of the physical problem is shown in Figure 1.

Let (x, y) denote the Cartesian coordinates for the upper fluid with $x = 0$ as the symmetry plane, and x-axis is taken along the interface between the two fluids. It is assumed that the surface is stretched or shrinked with the velocity $u_w(x) = cx$, where for a stretching sheet and for a shrinking sheet, respectively. It is also assumed that the constant mass velocity is v_0, where $v_0 < 0$ for suction and $v_0 > 0$ for injection or withdraw of the fluid, respectively. The coordinate system for the lower fluid is (x, y_2) as shown in Figure 1. Note that the z-axis is normal to the (x, y_1) plane.

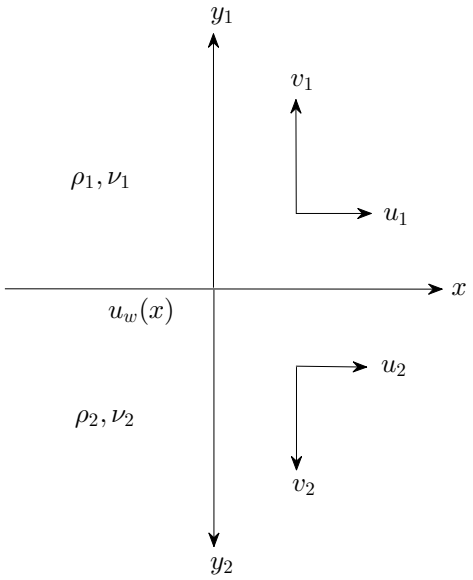

Figure 1: Physical coordinate.

The irrotational stagnation point flow in the upper fluid forwards the interface is described by

$$U_1 = ax, V_1 = -ay, N_1 = 0, \tag{1}$$

where $a(> 0)$ is constant. Thus, the boundary conditions for u_1, v_1 and N_1 are

$$u_1(x) \to U_1(x), v_1(x) \to V_1(x), N_1(x) \to 0 \text{ as } y_1 \to \infty. \tag{2}$$

Under the boundary layer approximations, the governing equations of continuity, momentum and energy are,

$$\frac{\partial u_i}{\partial x} + \frac{\partial v_i}{\partial y_i} = 0, \tag{3}$$

$$u_i \frac{\partial u_i}{\partial x} + v_i \frac{\partial u_i}{\partial y_i} = U_i \frac{dU_i}{dx} + \frac{\mu_i + \kappa_i}{\rho_i} \frac{\partial^2 u_i}{\partial y_i^2} + \frac{K_i}{\rho_i} \frac{\partial N_i}{\partial y_i}, \tag{4}$$

$$\rho_i j_i \left(u_i \frac{\partial N_i}{\partial x} + v_i \frac{\partial N_i}{\partial y_i} \right) = \gamma_i \frac{\partial^2 N_i}{\partial y_i^2} - k_i \left(2N_i + \frac{\partial u_i}{\partial y_i} \right), \tag{5}$$

subject to boundary conditions

$$\begin{aligned} &u_i(x) = cx, v_i = v_0, N_i = -n \frac{\partial u_i}{\partial y_i}, \text{ at } y_i = 0, \\ &u_i(x) \to ax, N_i \to 0, \text{ as } y_i \to \infty, \end{aligned} \tag{6}$$

where u_i and v_i are the velocity along x_i and y_i axes, N_i is the component of microrotation vector normal to $x - y$ plane and n is a constant.

The governing equations of the problem are later transformed into nonlinear system of ordinary differential equations (ODEs) using similarity transformation. Furthermore, the nonlinear system of ODEs are solved using finite difference technique with Richardson extrapolation in Maple software. The results show that upper fluid and lower fluid with difference density have

exactly same behavior when micropolar parameter, stretching or shrinking parameter and suction or injection parameter are equal for both fluids. It is also found that, when the values of micropolar parameter increase, velocity profiles, skin friction and microrotation of micropolar fluid is decrease. In addition, by rising the suction or injection parameter, the velocity profiles, skin friction and microrotation of micropolar fluid are also increased. Meanwhile as suction or injection parameter of lower fluid larger than of the upper fluid, the velocity profiles and skin friction for lower fluid more faster than upper fluid. It is also can be seen that the effect of permeability is more dominant than the effect of stretching or shrinking.

2010 Mathematics Subject Classification: 76A05, 76D10.
Keywords: Micropolar fluid, stretching or shrinking surface, another quiescent fluid.

CT – 014

Ramsey Minimal Graphs for P_4 Versus P_n

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For any given two graphs G and H, the notation $F \to (G, H)$ means that any red-blue coloring of all the edges of F will create either a red subgraph isomorphic to G or a blue subgraph isomorphic to H. A graph F is a Ramsey (G, H)-minimal graph if $F \to (G, H)$ but $F - e \nrightarrow (G, H)$, for every $e \in E(F)$. The set of all Ramsey (G, H)-minimal graphs (up to isomorphism) is denoted by $\mathcal{R}(G, H)$. The pair (G, H) will be called Ramsey-finite or Ramsey-infinite depending upon whether $\mathcal{R}(G, H)$ is finite or infinite, respectively. Several papers have discussed the problem of determining whether for a pair (G, H) of graphs the class $\mathcal{R}(G, H)$ is finite or infinite. It is known that the set $\mathcal{R}(P_m, P_n)$, for $n \geq m \geq 3$ is Ramsey-infinite.

Previously, we derived some properties of graphs in $\mathcal{R}(P_m, P_n)$, for $n > m \geq 4$. Furthermore, we constructed some infinite families of graphs in $\mathcal{R}(P_4, P_4)$. In this paper, we give all graphs of order at most 6 in $\mathcal{R}(P_4, P_4)$. By these graphs, we generate some graphs in $\mathcal{R}(P_4, P_n)$, for each $n \geq 5$. In particular, we construct some infinite families of graphs in $\mathcal{R}(P_4, P_n)$ for some $n \geq 5$.

2010 Mathematics Subject Classification: Primary 05D10; Secondary 05C55.
Keywords: coloring, Ramsey minimal graph, path, Ramsey infinite.

CT – 015

Influence of Heat Generation and Slip Velocity on MHD Convection Flow of Jeffrey Fluid with Convective Boundary Conditions

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The paper deal with the MHD free convection flow of Jeffrey fluid through a stretching or shrinking sheet. The influence of slip velocity and heat generation are taken into account. Developed nonlinear partial differential equations are reduced into ordinary differential equations by using appropriate transformations. Further, the ordinary differential equations are solved numerically for the significant variables. The effect of various non-dimensional governing parameters on velocity and temperature fields are graphically displayed and discussed. Velocity and temperature are functions of the slip parameter and heat generation parameter.

2010 Mathematics Subject Classification: 76A05.
Keywords: Jeffrey Fluid, Heat Generation, Slip Velocity.

CT – 016

Multivariate Statistical Analysis of Crimes; a Principal Component Analysis Approach

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Principal component analysis (PCA) can be described as a descriptive mathematical technique that extracts the main information in a dataset and presents the results graphically, nevertheless, statistical distribution theories are impose on PCA to examine the statistical distribution of the loadings and scores. In this paper, current crime statistics from the Malaysian states are examined from different perspectives. Data for the Malaysian crime index from 01/01/2009 to 31/12/2015 was analyzed using principal component analysis to see whether a small number of components can account for most of the variation in the original 13 crime variables. The analysis was carried out based on standardized variables, that is based on correlations. We were successful in extracting thirteen principal components and the first two

principal components account for over 93% of the variation in the original 13 variables. If for example we are to use this crime data as part of a larger set of Malaysia social indicators, then tabular illustrations would be extremely made easier by interpreting and reporting these two principal components scores rather than the 13 variables scores. The first principal component has a large variance of 11.1529 which accounted for $(\frac{11.1529}{13} \times 100)$ or approximately 85.79% of the variance in the 13 crime variables. The second and the subsequent principal components accounted for significantly less variances ranging from 7.33% for the second principal component to 0.0001% for the thirteenth (smallest) principal component, this motif for the variances is usual for highly correlated variables. The principal component loadings where used to interpret the principal components. The first principal component has positive but not very large correlations of about the same magnitude with all the crime variables, so we therefore called it a size factor and interpret it as an overall crime dimension. The second principal component has high positive loading for rape (a violent crime) and high negative loading for snatch theft (a property crime), since when we have an overall size factor the subsequent principal components with mixed positive and negative signs are generally interpreted as contradictions (contrast), we interpret this principal component as a contrast between violent crimes and property crime. Scores and loadings plot of the principal components are examined for a better understanding of the data and also for reasons such as checking for outlying observations and clusters. A careful examination of the score plot for the first two principal components reveals that 3 outlying observations appears in the plot, Johor is off by itself at the extreme upper part of the plot, Kuala Lumpur appears at the extreme end (downside) of the plot and Selangor show off at the upper right corner of the plot. Johor, Kuala Lumpur and Selangor had extremely high values for all the 13 crime variables, therefore they appear as outliers in the scores plot. Rotation of the principal components loadings was carried out in order to simplified them. Examining the rotated principal components plots, we find out that the points (variables) does not lie close to one or other of the axes, and therefore the rotated components does not exhibit a simple structure.

2010 Mathematics Subject Classification: 62H25, 62-07.
Keywords: correlation, loadings, scores, principal components, biplot, variance, eigenvalues, outlier, rotation, oblique,

CT – 017

Mixed Convection Flow of Second Grade Nanofluid in Presence of Gravity Modulation Over an Inclined Stretching Sheet

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The unsteady mixed convection flow of second grade nanofluid over an inclined stretching sheet under the influence of gravity modulation(g-jitter) is considered in this paper. Based on Tiwari-Das nanofluid model, the governing partial differential equations with the corresponding boundary conditions are transformed using suitable similarity transformations and solved numerically using Keller-box method, an implicit finite difference scheme. Numerical results for the dimensionless velocity and temperature as well as the skin friction and heat transfer coefficients are graphically displayed to investigate the effects of material parameter, inclination angle, amplitude of modulation, frequency of oscillation, and nanoparticles volume fraction on the fluid flow. It is shown that, the volume fraction of nanoparticles enhanced the heat transfer of the second grade fluid effectively.

2010 Mathematics Subject Classification: 76R99,76M20,82D80.
Keywords: Second grade fluid, nanoparticles volume fraction, inclined stretching sheet, g-jitter.

CT – 018

Fuzzy Time Series Forecasting using Sliding Window Method

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A Sliding Window Method is proposed for predicting class intervals in application of Fuzzy Time Series forecasting. Previously, most of researchers calculated the number of class intervals using frequency of classes. Then, the class intervals were re-divided into sub-intervals based on provided rank. While in this study, the concept of Sliding Window Method was embedded in the application of Fuzzy Time Series to predict number of class interval. The aim of the proposed method is to enhance the effectiveness of time series forecasting and to provide higher predicting accuracy. The daily dataset of Crude Palm Oil (CPO) prices were used to validate the proposed method. The accuracy of the proposed Fuzzy Time Series forecasting using sliding window method was compared with the previous Fuzzy Time Series method. The results from the numerical examples are comparable to the other methods even with the small size of class interval. In this research, the experimental results showed that the proposed method produce a more accurate frequency predicting of class intervals. The findings of this paper could be used as an alternative predicting method to obtain a better forecast value of class intervals.

2010 Mathematics Subject Classification: xxx.
Keywords: Fuzzy Time Series, Sliding Window Method, Class Intervals, Forecasting CPO Prices

CT – 019

The Connected Size Ramsey Number for Matchings Versus Disconnected Graphs

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Let F, G, and H be simple graphs. The notation $F \to (G, H)$ mean that if every edge of F is arbitrarily colored by red or blue, then there always exists either a red subgraph G or a blue subgraph H. The size Ramsey number of graph G and H, denoted by $\hat{r}(G, H)$ is the least integer k such that there is a graph F with k edges satisfying $F \to (G, H)$. In this research, we will study a modified size Ramsey number, namely the connected size Ramsey number. In this case, we only consider connected graphs F satisfying the above properties. This connected size Ramsey number of G and H is denoted by $\hat{r}_c(G, H)$. We will determine an upper bound $\hat{r}_c(nK_2, H)$, where H is a disconnected graph (isolated-free) and find the exact values of $\hat{r}_c(nK_2, 2P_3), n \geq 2$.

2010 Mathematics Subject Classification: 05D10, 05C55.
Keywords: connected size Ramsey number, disconnected graph, matching.

CT – 020

Efficient Alternative Method for Computing Multivariate Resultant

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In elimination theory, the matrix method of computing resultant remain the most popular due to its less computational complexity compared to Groebner basis and set characteristics approaches. However, for a matrix method to be effective, the size and the nature of elements of the matrix play an important role, since the resultant is extracted from the determinant of the matrix if it is not exact. In this paper, a new resultant matrix is proposed, the construction consist of four blocks, one of the blocks uses an entry formula of computing a Dixon matrix, while, two of the blocks use a mapping from the jouanolou's method and the last consist of only zero elements. The new formulation is computed without intermediate cancelling terms which reduces the complexity of the construction and enhance it's effectiveness.

2010 Mathematics Subject Classification: 11Y16, 33F10, 68W30.
Keywords: Resultant matrix, hybrid resultant, Dixon resultant, Jouanolou resultant.

CT – 021

Univariate Credibility as a Boundary-value Problem Symbolic Green's Function Method

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Current formulas in credibility theory often calculate net premium as a weighted sum of the average experience of the policyholder and the average experience of the entire collection of policyholders. Because these formulas are linear, they are easy to use. Another advantage of linear formulas is that the estimate changes a fixed amount per change in claim experience, if an insurer uses which a formal, then the policyholder can predict the change in premium.In a series of writing, Young(1997,1998,2000) apply decision theory to develop a credibility formula that minimizes a loss function that is linear combination of a squared-error term and a second-derivative term or first order term. This loss function as a variational forms, is equivalent to fourth order or second order linear differential equation, respectively. This allows for evaluation to Green's function computation via symbolic calculation to compute details of Green's function to obtain the solution.

2010 Mathematics Subject Classification: xxx.
Keywords: *boundary value problem, actuarial credibility, univariate, Green's function, symbolic calculation.*

CT – 022

The Effects of Internal Heat Generation on Mixed Convection Boundary Layer Flow embedded in a Porous Medium filled with a Nanofluid: A Stability Analysis

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A study of mixed convection boundary layer flow with internal heat generation embedded in a porous medium filled with a nanofluid is performed in this study. The governing system of nonlinear partial differential equations has been reduced into a system of ordinary differential equations by using a similarity transformation. These equations are then solved numerically by shooting technique method for three types of nanoparticles, namely copper, (Cu), alumina (Al_2O_3) and titania (TiO_2). The effects of governing parameters such as mixed convection and heat generation parameters have been observed and discussed in detail. In this present work, dual solutions are observed in a certain range of governing parameters. We then performed a stability analysis by a bvp4c function to determine which solution is stable between non-unique solutions and the features of the respective solutions have been discussed.

2017 Mathematics Subject Classification: Fluid Dynamics.
Keywords: Mixed convection, boundary layer, nanofluid, porous medium, internal heat generation, stability analysis.

CT – 023

$\mathcal{R}$-Boundedness of Solution Operator Families for Compressible Fluid Flow of The Oldroyd-B Model Fluid Flow with Surface Tension

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We prove the $\mathcal{R}$-boundedness of solution operator families for compressible viscous barotropic fluid flow of the Oldroyd-B model with taking account the surface tension in a bounded domain of N- dimensional Euclidean space ($N \geq 2$) which implies not only the generation of analytic semigroup but also the maximal L_p-L_q regularity for the initial boundary value problem. Our initial domain Ω is one of a bounded domain and perturbed half-space or a perturbed layer.

2010 Mathematics Subject Classification: 35Q35, 76N10.
Keywords: $\mathcal{R}$-boundedness of solution operator families, compressible viscous barotropic fluid flow, Oldroyd-B model, generation of analytic semigroup, maximal L_p-L_q regularity.

CT – 024

A Stability Analysis of Boundary Layer Stagnation-Point Slip Flow and Heat Transfer Towards A Shrinking/Stretching Cyclinder Over a Permeable Surface

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The problem of boundary layer stagnation-point slip flow and heat transfer towards a shrinking/stretching cylinder over a permeable surface is studied. The partial differential equations governing will be transformed to a set of coupled nonlinear nonsimilar equations via similarity transformations. The transformed governing equations are solved numerically using the bvp4c which is the boundary value problem solver in MATLAB software. It is reveal that dual solutions exist in our observations. Further, the stability analysis is performed to determine which solution is linearly stable and physically realizable.

2010 Mathematics Subject Classification: Fluid dynamics.
Keywords: Stability analysis, Stagnation-point, Heat transfer, Shrinking/Stretching cylinder, Permeable surface.

CT – 025

On Size Tripartite Ramsey Numbers of $mK_{1,n}$ Versus C_3

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Let $K_{l\times t}$ be a complete, balanced, multipartite graph consisting of l partite sets and t vertices in each partite set. For simple graphs G and H, the size multipartite Ramsey number $m_j(G,H)$ is the smallest natural number t such that any arbitrary red-blue coloring on the edges of $K_{j\times t}$ contains a red G or a blue H as a subgraph. In particular, if $j=2$ then $m_2(G,H)$ is called the size bipartite Ramsey numbers of G and H. Hattingh and Henning (1998) gave the results for the size bipartite Ramsey numbers of stars versus paths, $m_2(K_{1,m},P_n)$, for $m,n\geq 2$.

If $j = 3$ then $m_3(G, H)$ is called the size tripartite Ramsey numbers of G and H. We have been studies about the size tripartite Ramsey numbers $m_3(mK_{1,n}, P_3)$, for $m \geq 1, n \geq 2$, where $mK_{1,n}$ is a disjoint union of m copies of a star $K_{1,n}$ and P_3 is a path of order 3 (2016). In this paper, we determine the exact value of the size tripartite numbers $m_3(mK_{1,n}, C_3)$ for all integers $m, n \geq 1$, where C_3 is a cycle of order 3.

2010 Mathematics Subject Classification: Primary 05D10; Secondary 05C55.
Keywords: cycle, size tripartite Ramsey number, star.

CT – 026

The Spectrums of Non-Commuting Graph of Generalized Quaternion and Quasidihedral Groups

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Let G be a finite non-abelian group with center $Z(G)$. The non-commuting graph Γ_G, is a simple undirected connected graph in which , the vertex set of Γ_G is $G \backslash Z(G)$, and two vertices a and b are adjacent if and only if they do not commute. In this paper we compute the spectrum of the non-commuting graph of generalized quaternion and quasidihedral groups.

2010 Mathematics Subject Classification: 20B05.
keywords: Non-Commuting Graph, Spectrum, Generalized and Quasidihedral Groups.

CT – 027

Radiation Effect on MHD Ferrofluid Flow with Ramped Wall Temperature and Arbitrary Wall Shear Stress

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The unsteady two dimensional, incompressible boundary layer flow with magnetic field and radiative heat transfer effects of Ferrofluid over vertical plate is studied. The plate with ramped temperature and arbitrary wall shear stress are also considered. Water containing suspended nanoparticles of magnetite (Fe_3O_4) was selected as a conventional base fluid. The coupled partial differential equations governing the flow with physical boundary conditions are solved by using the Laplace transform technique. The analytical solutions for velocity and temperature in case of both ramped and constant wall temperature are obtained. Graphical results with various parameters are discussed in details.

2010 Mathematics Subject Classification: 76R99,76M20,82D80.
Keywords: Ferrofluid. MHD flow. Radiation. Ramped wall temperature. Free convection. Exact solutions. (Fe_3O_4).

CT – 028

Finite Element Analysis of Magnetohydrodynamics Blood Flow through an Overlapping Stenosed Bifurcated Artery

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Blood flow through a bifurcated artery with the presence of an overlapping stenosis under the action of a uniform external magnetic field is investigated in this paper. Blood is treated as an electrically conducting fluid, which exhibits the principles of magnetohydrodynamics (MHD). The blood flow is assumed to be an incompressible, steady, laminar and Newtonian fluid. Whereas, the arterial bifurcation is considered as a rigid wall with no slip conditions and it has been modelled as a two-dimensional channel. The governing equations describing the Newtonian blood flow under the presence of a magnetic field is discretized using Galerkin weighted residual type of Finite Element Method (FEM). The effects of an overlapping stenosis located at the mother artery with the presence of a magnetic field to the blood flow characteristics have been examined in details. The results show that the magnetic field considerably declining the velocity of blood. If magnetic intensity is further increased, it might even lead to plaque rupture. Apparently, by increasing the magnetic field also the recirculation zone formed downstream of the stenosis reduced appreciably. Hence, this study is significantly useful for the treatment of cardiovascular diseases that involve the application of an external magnetic field on blood flow.

2010 Mathematics Subject Classification: 47.15.-x.
Keywords: FEM, MHD, Overlapping Stenosis, Bifurcated Artery.

CT – 029

Characterization of $(\in, \in \vee q_k)$ Fuzzy Quasi $\Gamma-$ideals in Ordered $\Gamma-$semigroups

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The idea of belongs to and generalized quasi coincidence with relation of fuzzy point with fuzzy set is explored. In this paper, we classify the new form of fuzzy quasi $\Gamma-$ideals in ordered $\Gamma-$semigroup. The relation between quasi $\Gamma-$ideals of the form $(\in, \in \vee q_k)$ and quasi $\Gamma-$ideals in ordered $\Gamma-$semigroups is developed. Further, it is shown that every $(\in, \in \vee q_k)-$quasi $\Gamma-$ideals is a $(\in, \in \vee q_k)$ bi $\Gamma-$ideals.

2010 Mathematics Subject Classification: 20N25.
Keywords: ordered $\Gamma-$semigroups, quasi $\Gamma-$ideals, $(\in, \in \vee q_k)-$fuzzy quasi $\Gamma-$ideals, and bi $\Gamma-$ideals.

CT – 030

On The Energy of Conjugate Graphs for Some Metabelian Groups

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The energy of a graph of a group G is the sum of all absolute values of the eigenvalues of the adjacency matrix. An adjacency matrix is a square matrix where the rows and columns consist of 0 or 1-entry depending on the adjacency of the vertices of the graph. A conjugate graph is a graph whose vertex set is the non-central elements of the group where two distinct vertices are connected by an edge if they are conjugate to each other. Meanwhile, a group G

is said to be metabelian if there exists a normal subgroup H in G such that both H and the factor group G/H are abelian. In this research, the energy of the conjugacy class graphs for some nonabelian metabelian groups of order 24 are determined. The computations are assisted by Groups, Algorithm and Programming (GAP) and Maple2016 software.

2010 Mathematics Subject Classification: 05C50.
Keywords: Energy of graph; Eigenvalues; Adjacency matrix; Conjugate graph; Metabelian.

CT – 031

Impossible Differential Characteristic On Modified (Nonundisturbed bit) PRESENT

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On 2014, PRESENT algorithm was attacked using improbable differential attack. The author found 6 undisturbed bit on PRESENT′s S-Box, and used it to get 6 round impossible differential characteristics. Without undisturbed bit, the author could manage to get 4 round impossible differential characteristics only. On FSE 2015, classification of 4-bit optimal S-boxes was done to be applicable on PRESENT, RECTANGLE, and SPONGENT algorithm. The author got 14 classes of S-box (8064 S-box) which fulfill the design criteria of PRESENT′s S-box. In this research, we tried to search for S-boxes that possess no undisturbed bit in the range of 14 classes mentioned above. As a result, we found 4 classes of S-boxes that have no possession of undisturbed bit. Next, we apply the S-boxes on PRESENT algorithm as a replacement for the original PRESENT′s S-box. Then, we will find the impossible differential characteristics on modified (nonundisturbed bit) PRESENT to get a knowledge about the resistance of modified PRESENT against impossible differential.

2010 Mathematics Subject Classification:.
Keywords: : S-Box; Undisturbed Bit; PRESENT block cipher; Impossible Differential.

CT – 032

A Periodicity of The Grover Walk on Bethe trees

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We consider a periodicity of the Grover walk on a Bethe tree which is a rooted tree such that in each level the vertices have equal degree. We agree that the root vertex is at level 0,

and this tree has $(n+1)$ levels. Let C_i be the vertices set of level i for $i \in [0,n]$. Then for every $i \in [0,n-1]$ the value $|N(v) \cup C_{i+1}|$ is constant whenever v is in C_i, where $N(v)$ is a neighbor set of the vertex v. We put $d(i) = |N(v) \cup C_{i+1}|$ for $i \in [0,n-1]$, and a Bethe tree is denoted by $B(d(0), d(1), \cdots, d(n-1))$. If a Bethe tree is not path graph, then there exists $i_0 \in [0,n]$ such that $|C_0| = |C_1| = \cdots = |C_{i_0}| = 1, |C_i| \geq 2$ for $i \in [i_0+1, n]$. In this paper we assume that $d(i) \geq 2$ for $i \in [i_0, n-1]$.
Let $G = (V,E)$ be a graph and $D(G)$ be a set of symmetric arcs of G. The Grover walk is a kind of quantum walks on graphs and it is given by the unitary time evolution operator U, which is called the Grover transfer matrix. Since the Grover transfer matrix is determined by the graph, the Grover walk is induced by the graph. A periodic Grover walk means that there exists an integer k such that for *any* initial state $\varphi_0 \in \ell^2(D(G))$, $\varphi_k = U^k\varphi_0 = \varphi_0$, and $\varphi_j = U^j\varphi_0 \neq \varphi_0$ for every $0 < j < k$. In other words, the Grover transfer matrix U satisfies that $U^k = I_{2|E|}$, and $U^j \neq I_{2|E|}$ for every $0 < j < k$. It also implies that $\lambda_U^k = 1$ for every $\lambda_U \in \sigma(U)$, and there exists $\lambda_U \in \sigma(U)$ such that $\lambda_U^k \neq 1$ for every $0 < j < k$, where $\sigma(U)$ is a set of eigenvalues of U.
We prove that under the assumption of $d(i) \geq 2$ for $i \in [i_0, n-1]$, there are only two kind of Bethe trees (not path and star graphs) which induce a periodic Grover walk, whose periods are 12.

2010 Mathematics Subject Classification: xxx.
Keywords: Bethe tree, Grover walk, Periodicity.

CT – 034

Unsteady MHD Stagnation-point Flow and Heat Transfer Toward A Shrinking Sheet with Thermal Radiation and Slip Effects : A Stability Analysis

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This study is set out to investigate the stagnation-point flow and heat transfer toward a shrinking sheet with thermal radiation and slip effects. By using similarity transformation, the governing partial differential equations will be able to reduce to an ordinary differential equations. The resulting equations are worked out Bvp4c solver in Matlab. A linear stability analysis shows that only one solution is linearly stable otherwise is unstable. Based on the numerical results obtained, the dual solutions do exist in the range $A < 0$ for shrinking sheet. Then, a stability analysis is carry out to identify which solution is stable and physically realizable.

2010 Mathematics Subject Classification: Fluid dynamics
itKeywords: Stagnation-point, thermal radiation, stability analysis, MHD, shrinking sheet

CT – 035

Measurement Algebra of Complementary Observables for Dimensions Two to Five

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In Categorical Quantum Mechanics, the outcomes of a measurement is represented by the so called observable structures, which consist of processes called spiders. One such spider induces a binary operation of a group on those states which are unbiased to the observable structure. In this work, we examine how the binary operation of one observable structure acts on the copyable states of a complementary observable structure in complex Hilbert spaces of dimensions 2 to 5. We show that for dimensions 2, 3 and 5, the action of the binary operation of one observable structure on the copyable states of a complementary observable structure produces copyable states of an observable structure complementary to the two previously mentioned observable structure. The case of dimension 4 needs further examination. However, we have found that the binary operations of two observable structures (out of the four non-standard complementary observable structures in this dimension) also produce a group-like structure on the copyable states of their complementary observables. We say group-like as the binary operation is not closed. Furthermore, the resulting states are the states from the standard basis which is similar to the case of dimension 2, but different from the cases of dimensions 3 and 5 where the resulting states are not elements of the standard basis.

2010 Mathematics Subject Classification: 81R05, 81P10.
Keywords: Mutually Unbiased Bases, Categorical Quantum Mechanics, Quantum Measurement.

CT – 037

Students Mathematization Ability in The Implementation of Generative Learning Model

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This research aims to analyze the improvement of mathematization ability in students who obtain either Generative Learning (GL) or Conventional Learning (CL), based on Early Mathematical Understandings (EMU). Mixed methods with embedded experiment design are applied

as the research method. The research subjects, who are selected purposively, in this study are 73 students in grade 8 from two classes of Junior High School. The results of the research are: (1) mathematization ability improvement of students obtaining Generative Learning is similiar to students obtaining Conventional Learning, observed as a whole, High EMU, and Low EMU. (2) mathematization ability improvement of students obtaining Generative Learning is better than students obtaining Conventional Learning, reviewed from Medium EMU. (3) There are interactions between Generative and Conventional Learning models as well as Early Mathematical Understandings (High, Medium, Low) toward the improvement of students mathematization ability.

2010 Mathematics Subject Classification:
Keywords: Generative Learning, Conventional Learning, Early Mathematical Understandings

CT – 038

On the Vertex Irregular Total Labeling for Subdivision of Trees

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Let $G = (V, E)$ be a simple, connected and undirected graph with non empty vertex set V and edge set E. A *labeling* of graph is an assignment of numbers to the vertex or edges, or both subject to certain condition. We define a labeling $\phi : V \cup E \to \{1, 2, 3, \ldots, k\}$ to be a *vertex irregular total k-labeling* of G if for every two different vertices x and y of G, their weights $w(x)$ and $w(y)$ are distinct, where the weight $w(x)$ of a vertex $x \in V$ is $w(x) = \phi(x) + \sum_{xy \in E(G)} \phi(xy)$. The minimum k for which the graph G has a vertex irregular total k-labeling is called the *total vertex irregularity strength* of G, denoted by $tvs(G)$. The *subdivision* graph $S(G)$ of a graph G is that graph obtained from G by replacing for each edges $e = uv$ with path $(u, x_1, x_2, \ldots, x_r, v)$ on r subdivision vertices of degree two. Let T be a tree. We define an irregular subdivision graph $S(T; r_i; s_j)$ of a graph T is that graph obtained from T by replacing for each pendant edges $e = ab$ and interior edges $s = cd$ with path $(a, x_1, x_2, \ldots, x_{r_i}, b)$ and $(c, v_1, v_2, \ldots, v_{s_j}, d)$ on r_i and s_j subdivision vertices of degree two, respectively.

In 2010, Nurdin, Baskoro, Salman and Gaos conjectured that $tvs(T) = max\{t_1, t_2, t_3\}$, where $t_i = \lceil (1 + \sum_{j=1}^{i} n_i)/(i+1) \rceil$ and n_i is the number of vertices of degree $i \in [1, 3]$. In this paper, we show that the the total vertex irregularity strength of $S(T; r_i; s_j)$ equal to t_2. This paper adds further support to Conjecture Nurdin *et.al* (2010) by showing that such subdivision of any tree has total vertex irregularity strength equal to t_2.

2010 Mathematics Subject Classification: 05C05, 05C76, 05C78.
Keywords: Tree, labeling, subdivision, total vertex irregularity strength, total k-irregular labeling, irregularity strength.

CT – 039

The Application of a Non-Crossing P-splines Quantile Regression to Evaluate the Growth of Indonesian Education Quality

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The Indonesian education quality can be evaluated via a growth curve. A popular technique to generate a growth curve is LMS method. Unfortunately, LMS method has some drawbacks. One of them is its weakness against the existence of outlier(s). Therefore, in this research, we propose a robust technique which so-called quantile regression. Since a growth curve is a function of times, we then need to generate a time dependence model, called time varying coefficient model. We approximate each coefficients of the model by means of B-splines function. The quantile objective function is penalized by difference of the adjacent coefficients of the basis B-splines which we call P-splines quantile objective function. A classical problem may appear in quantile objective function is crossing curves. To avoid the crossings of conditional quantile curves, we propose an AHe-approach where the estimation procedure is started at the median of the curve and then moving up and down to the higher and lower level of quantiles. Some numerical studies together with the detailed procedure will be presented.

2010 Mathematics Subject Classification: 6207, 62G08,62G35,62G86.
Keywords: Quantile Regression, Varying-Coefficient Models, P-splines, Non-crossing curves, National Education Standards.

CT – 040

Numerical Solution for A Class of Fractional Optimal Control Problem via Second Order B-spline Function

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In this paper, we solve a class of fractional optimal control problems (FOCPs) by using operational matrix of fractional integration which derived from second order basis spline (B-spline) function. The fractional derivative is defined in the Riemann-Liouville fractional integral operator. The B-spline function with unknown coefficients and B-spline operational matrix of integration are used to replace the fractional derivative which is in the dynamic constraints. Then, the derivation from dynamic constraints is employed to the performance index. Next, we applied the method of constrained extremum which involved a set of Lagrange multipliers. As a result, we get a system of algebraic equations based on the necessary condition of optimality for the performance index which can be solve easily. Hence, the value for unknown coefficients of B-spline function is obtained as well as the solution for the FOCPs. Finally, the illustrative examples shown the validity and applicability of this method to solve FOCPs.

2010 Mathematics Subject Classification: 49M05,49M30.
Keywords: fractional optimal control problems, B-spline function, operational matrix of integration, Riemann-Liouville fractional integration, Lagrange multiplier.

CT – 041

A New Construction of Quantum Walks Based on A Graph Theoretical Approach

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Many quantum walk models have been proposed depending on the research background since the coined walks were introduced around the beginning of 2000's. For example, in the studies on spectral and scattering point of view [1, 2], it is useful to consider the formulation of coined walks itself; in quantum spatial search in the context of quantum computing, the quantum walk is expressed as a bipartite walk [5]; from a graph-theoretical viewpoint, using the notion of clique decomposition of graphs, the quantum walk is extended to a staggered walk [4]; it is also possible to propose an extension of the quantum walk to simplicial complexes [3]. In this talk, we attempt to look down upon the quantum walk models through a generalized model named two-partition walk introduced here. We show the unitary equivalences of the above quantum walk models to the two-partition walk, which implies that we can choose our preferred model according to our research interest, if we restrict ourselves to models that use only two local operators.

2010 Mathematics Subject Classification: 05C62.
Keywords: Quantum walk, clique decomposition.

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CT – 042

Local Intruction Theory Equations and Linear Inequalities One Variable for Growing the Ability of Algebraic Thinking

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To anticipate, reduce or even eliminate the obstacles that arise during the learning process, need to be made learning trajectories or learning path, so the problem in this study is intended to reveal: Learning difficulties which experienced by students in learning the material equations and linear inequality one variable reviewed from Mathematical disposition. The research method is in the form of design research, with the subjects of the study amounting to 7 junior high school students who come from the middle school level ranking. From the result of the research, it is found that learning difficulties experienced by students in studying the material of equation and linear inequality of one variable is in the expression of linear equations of one equivalent variable, using algebraic concept in solving social arithmetic problem and comparison for problem solving.

2010 Mathematics Subject Classification:
Keywords: LIT, HLT, PMR, Thinking of Algebra.

CT – 043

The Application of Algebraic Geometry in the Sylvester-Bézout Construction

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This paper is to construct and implement the algorithm of Bézout resultant matrix formulation. The basis of this implementation applies some related concepts and tools from algebraic geometry. The major tasks in this paper are determining the degree vector of the homogeneous variables known as homogeneous coordinates and solving a set of linear inequalities named 5-Rule. In this work, the method of solving the 5-Rule involves a systematic procedure or combinatorial approach on the set of exponent vectors of the monomials and the coefficients of facet variables called bracket $[uvw]$. The computations of the bracket variables are found to have additional conditions for effectiveness and efficiency generating the entries of the Bézout matrix. The algorithm terminates with the correct matrix dimension and the computational cost is $O(n^3)$.

2010 Mathematics Subject Classification:
Keywords: Algebraic geometry, Bézout resultant matrix, homogeneous coordinates.

CT – 044

Implementation of GSTAR-Kriging Model to Predict Rainfall Data at Unoberved Locations in West Java

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A Generalized Space AutoRegressive or GSTAR is a special model of Vector AutoRegressive (VAR) model which is a combination of time series model and spatial model which has the assumption of autoregressive parameter and space time parameter having different value for each location of observation. In addition it assumes stationary time series data at the mean and variance levels and applies to locations with heterogeneous characteristics. One disadvantage of the GSTAR model is that it can not be used for prediction at unobserved locations.

In this paper we combine the GSTAR model with the Ordinary Kriging technique, named GSTAR-Kriging model so that the GSTAR model can be used for prediction in unobserved locations. GSTAR parameters estimated using the Ordinary Least Squares (OLS) method are used as inputs for the Kriging technique. Furthermore, by generating normal distributed errors in unobserved locations and using linear semivariogram we can obtain simulations of the GSTAR model equations. Fitted GSTAR-Kriging model is shown with Mean Average Percentage Error (MAPE) value less than 10%.

For the case study we used monthly rainfall data from several locations in West Java, namely: Bandung, Garut and Tasikmalaya as sample locations and Sukabumi, Cianjur, Bandung Barat,

Bogor and Ciamis as unobserved locations. The result of the research shows that with GSTAR-Kriging model we get a space time model based on multivariate time series that can be used to predict the phenomenon of rainfall data in unobserved locations.

2010 Mathematics Subject Classification: 60G10, 62H11,62M30,62M10.
Keywords: GSTAR-Kriging, OLS, Semivariogram, Ordinary Kriging, MAPE, Rainfall.

CT – 045

Open Neighborhood Locating-dominating Set in Mycielski Graph

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A monitored system can be modeled as a graph G. Such that the intruder detection is location-specific and efficient, placing monitoring devices in the system can be considered as an open neighborhood locating-dominating problem. An open neighborhood locating-dominating set S in graph G is a minimum vertex set with the property that for each vertex v in G, its open neighborhood has a unique non-empty intersection with S. In this paper, we will continue the discussion of OLD-set problem, specifically in Mycielski graphs.

2010 Mathematics Subject Classification: 05C69.
Keywords: Mycielski graph, locating-dominating set, open neighborhood locating-dominating number.

CT – 046

The Strong 3-rainbow Index of Amalgamation of Fans and Shackle of Fans

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All graphs considered in this paper are simple, finite and undirected. We follow the terminology and notation of Diestel [4]. Let G be a nontrivial, connected and edge-colored graph of order n, where adjacent edges may be colored the same. A path P is *rainbow path*, if no two edges of P receive the same color. An edge-coloring of G is called a *rainbow coloring* of G, if for each pair u and v of distinct vertices of G, G contains a $u-v$ rainbow path. The minimum number of colors needed in a rainbow coloring of G is the *rainbow connection number* $rc(G)$ of G which first introduced by Chartrand et.al. in 2008 [3]. In [5], Fitriani and Salman have given the rainbow connection number of amalgamation of some graphs.

Another generalization of rainbow connection number was introduced by Chartrand et. al. in 2010 [2]. A tree T in G is a *rainbow tree*, if no two edges of T receive the same color. Let k be an integer with $2 \leq k \leq n$. A *k-rainbow coloring* of G is an edge-coloring of G having property that for every set S of k vertices of G, there exists a rainbow tree T such that $S \subseteq V(T)$. The minimum number of colors needed in a k-rainbow coloring of G is the *k-rainbow index* $rx_k(G)$ of G. It is obvious that $rx_2(G) = rc(G)$. For every nontrivial connected graph G of order n, it is easy to see that $rx_2(G) \leq rx_3(G) \leq ... \leq rx_n(G)$.
The *Steiner distance* $d(S)$ of a set S of vertices in G is the minimum size of a tree in G containing S. Such a tree is called a *Steiner S-tree* or simply a *Steiner tree*. The *k-Steiner diameter* of G, denoted by $sdiam_k(G)$, is the maximum Steiner distance of S among all sets of S with k vertices in G. Thus if $k = 2$ and $S = \{u, v\}$, then $d(S) = d(u, v)$ and $sdiam_2(G) = diam(G)$. In [2], they provided a simple upper bound and a lower bound for $rx_k(G)$, that is $k - 1 \leq sdiam_k(G) \leq rx_k(G) \leq n - 1$.
In this paper, we determine the strong 3-rainbow index of amalgamation of fans. We also determine the strong 3-rainbow index of shackle of fans. For simplifying, we define $[a, b] = \{x \in \mathbb{Z} | a \leq x \leq b\}$.
A *strong k-rainbow coloring* of G is an edge-coloring of G having property that for every set S of k vertices of G, there exists a rainbow Steiner S-tree T such that $S \subseteq V(T)$. The minimum number of colors needed in a strong k-rainbow coloring of G is the *strong k-rainbow index* of G, denoted by $srx_k(G)$.
For $n \geq 3$, a *fan* F_n is a graph constructed by joining a vertex v to every vertex of a path $P_n : v_1, v_2, ..., v_n$. The vertex v is called the *center vertex* of F_n. For each $i \in [1, n]$, edge vv_i is called *spokes* of F_n.
For $t \in \mathbb{N}$ with $t \geq 2$, let $\{G_1, G_2, ..., G_t\}$ be a collection of finite, simple, and connected graphs and each G_i has a fixed vertex v_{o_i} called a *terminal*. The *amalgamation* $Amal(G_i, v_{o_i})$ is a graph obtained by taking all the G_i's and identifying their terminals [1]. If for each $i \in [1, t]$, $G_i \cong G$ and $v_{o_i} = v$, $Amal(G_i, v_{o_i})$ denoted by $Amal(G, v, t)$. Let $s \in \mathbb{N}$ with $1 \leq s < t$. If for each $i \in [1, t]$, $G_i \cong G$, for each $j \in [1, s]$, $v_{o_j} = v_1$, and for each $j \in [s + 1, t]$, $v_{o_j} = v_2$, $Amal(G_i, v_{o_i})$ denoted by $Amal(G, v_1, s, v_2, t - s)$.
Let $t \in \mathbb{N}$ with $t \geq 2$. A *shackle* $shack\,(G_1, G_2, ..., G_t)$ is a graph constructed by nontrivial connected graphs $G_1, G_2, ..., G_t$ such that for every $i, j \in [1, t]$ with $|i - j| > 2$, G_i and G_j have no common vertex, and for every $i \in [1, t - 1]$, G_i and G_{i+1} share exactly one common vertex, called *linkage vertex*, and the $t - 1$ linkage vertices are all distinct [6]. If for each $i \in [1, t]$, $G_i \cong G$, $shack\,(G_1, G_2, ..., G_t)$ denoted by $shack(G, t)$.
In this paper, we have determined the strong 3-rainbow index of $Amal(F_n, v, t)$, where v is the center vertex of F_n and v is an arbitrary vertex in F_n which is not the center vertex. We also have determined the strong 3-rainbow index of $Amal(F_n, v_1, s, v_2, t - s)$, where v_1 is the center vertex of F_n and v_2 is an arbitrary vertex in F_n which is not the center vertex. Additionally, we have determined the strong 3-rainbow index of $shack(F_n, t)$.

2010 Mathematics Subject Classification: 05C05, 05C15, 05C76.
Keywords: amalgamation, fan, rainbow steiner tree, shack.

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CT – 047

Estimating Heterogeneous Coefficients in Panel Data Model by Means Bayesian Approach

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Panel data have been developed to explain the unobserved heterogeneity and the models usually presented with varying intercept given unit cross-section. In many cases, the constant slope of the model does not fit to explain the reality and the homoscedasticity assumption usually violates. The standard panel models (i.e., fixed or random effect models) do not satisfy for this condition. To motivate this condition let us consider the effect of the behavior of clean and healthy living index to the prevalence rate of Tuberculosis (TB^+) in several districts. The two districts may have the equal behavior of clean and healthy living index. The standard panel model allows for two districts with identical index to have different expected prevalence rate (i.e. due to different intercepts). Furthermore, it allows for the marginal effect of behavior of clean and healthy living index on prevalence rate of TB^+ to vary across districts (i.e. due to different slope coefficients). If the variability of population density is important, then such interaction between population density and behavior of clean and healthy living index might occur and lead to non stationarity problem. The standard panel data model with classical estimation approaches (i.e.: Ordinary least square, maximum likelihood) are not easy to be used. The classical approaches the lead to identifiability problem. Beside of that, the unbiasedness, consistency, and efficiency become the serious problems that have to be solved. To overcome non stationary problem in Panel Data, we introduce the heterogeneous coefficients model with Bayesian estimation.

2010 Mathematics Subject Classification: xxx.
Bayesian, DIC, Heterogeneous Coefficients, MCMC, TB^+: xxx.

CT – 048

The Generalized Space Time Autoregressive-ARCH (GSTAR-ARCH) Model to Forecast Rainfall on Disaster-Prone Areas in West Java

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Rainfall in West Java in 2016 shows extreme phenomena, causing hydrometeorological disasters such as floods and landslides in some districts / cities. Rainfall data in several disaster prone areas in West Java indicates that there is non-constant variance, requiring a simultaneous space time model approach for the future. In this study we studied the development of Generalized Space Time AutoRegressive (GSTAR) model combined with AutoRegressive Conditionally Heteroskedasticity (ARCH) model to overcome the non-constant error assumption, it is called GSTAR-ARCH model.

The GSTAR-ARCH model is identified as a stationary GSTAR model in the mean with normal distributed errors but has a non-constant variance and has an ARCH effect. The GSTAR-ARCH parameter estimation is done in two stages. First, the variance equation parameter is estimated by Maximum Likelihood (ML) through scoring method. Second, the GSTAR mean equation parameter is estimated with Generalized Least Squares (GLS). GLS method is obtained by doing a linear transformation of the model to obtain a transformation form that meets the assumption of the least squares method of appraisal. The forecast accuracy is measured by Mean Absolute Percentage Error (MAPE).

For case studies we select monthly rainfall data in some disaster-prone districts / cities in West Java. The selection of disaster prone areas (eg floods or landslides) is based on the National Disaster Management Agency (BNPB) report in 2016 and is focused on three adjacent and highly correlated sites, consisting of: Bandung, Garut, and Tasikmalaya.Forecasting of rainfall data Using the GSTAR-ARCH model is expected to contribute to weather forecasting decision makers in West Java Province.

2010 Mathematics Subject Classification: 60G10, 62H11, 62M30, 62M10.
Keywords: GSTAR-ARCH, Rainfall, Disaster prone areas, GLS, MLE.

CT – 049

Geodetic Domination in Mycielski Graphs

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A subset S of vertices in a graph G is called a *geodetic domination set* if S is both a geodetic set and a dominating set. The minimum cardinality of a geodetic domination of G is *geodetic domination number*, denoted by $\gamma_g(G)$. In this paper, we study the geodetic domination number on Mycielski graphs. We provide the lower and upper bounds of the geodetic domination number on Mycielski of any connected graphs.

2010 Mathematics Subject Classification: 05C69, 05C76, 05C38.
Keywords: domination, geodetic, geodetic domination, Mycielski graph.

CT – 050

Formal Analysis Using Scyther on SOFU-11 Key Exchange Protocol

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Key exchange protocol is one of kind from key establishment where the session key is generated by one of party in the protocol. One of key exchange protocol that has been proposed is SOFU-11. SOFU-11 uses block cipher and hash function to provide aspect of confidentiality, authentication, integrity and non-repudiation data in the protocol. Furthermore, SOFU-11 also uses timestamp to guarantee resistibility from replay attack and man in the middle attack. In this protocol claimed that SOFU-11 fulfill security and authenticity of the data, also resistance to replay attack and man in the middle attack. But, the reseacher did not use formal analysis yet. In this paper, we use scyther as tools to do formal analysis. The result from formal analysis shows that SOFU-11 does not fulfill security of cryptographic protocol.

2010 Mathematics Subject Classification:
Keywords: SOFU-11, Key Exchange Protocol, Formal Analysis, Scyther.

CT – 051

An Algorithm to Construct New Optimal $\mathbb{Z}_2\mathbb{Z}_4$-Additive Cyclic Code

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A non-empty subset C of $\mathbb{Z}_2^r \times \mathbb{Z}_4^s$ is called $\mathbb{Z}_2\mathbb{Z}_4$-*additive code* if C is a subgroup of $\mathbb{Z}_2^r \times \mathbb{Z}_4^s$, i.e., C is isomorphic to $\mathbb{Z}_2^\gamma \times \mathbb{Z}_4^\delta$, for some positive integers γ and δ. A $\mathbb{Z}_2\mathbb{Z}_4$-additive codes $C \subseteq \mathbb{Z}_2^r \times \mathbb{Z}_4^s$ is called *cyclic* if for every codewords in C, the cyclic shift of the codewords are also in C. Let C_b be the subcode of C which contains all order two codewords and let k be the dimension of $(C_b)_X$, the punctured code of C_b by deleting the coordinates put of X. Here, the $\mathbb{Z}_2\mathbb{Z}_4$-additive code $C \subseteq \mathbb{Z}_2^r \times \mathbb{Z}_4^s$, isomorphic to $\mathbb{Z}_2^\gamma \times \mathbb{Z}_4^\delta$, is called of type $(r, s, \gamma, \delta, k)$, where k is as above. It is well-known that all $\mathbb{Z}_2\mathbb{Z}_4$-additive code C of type $(r, s, \gamma, \delta, k)$ satisfies either

$$\frac{d(C)-1}{2} \leq \frac{r}{2} + s - \frac{\gamma}{2} - \delta, \text{ or}$$

$$\lfloor \frac{d(C)-1}{2} \rfloor \leq r + s - \gamma - \delta,$$

where $d(C)$ denotes the minimum distance of the code. The code C is called *optimal* if one of the above equality is attained.

There is also another kind of optimality of the code. Defined an extended Gray map from $\mathbb{Z}_2^r \times \mathbb{Z}_4^s$ as

$$\Phi : \mathbb{Z}_2^r \times \mathbb{Z}_4^s \to \mathbb{Z}_2^n$$

$$\Phi(x, y) = (x, \phi(y_1), \cdots, \phi(y_s)$$

where $x \in \mathbb{Z}_2^r$ and $y \in \mathbb{Z}_4^s$ and $\phi(0) = (0, 0)$, $\phi(1) = (0, 1)$, $\phi(2) = (1, 1)$ and $\phi(3) = (0, 1)$. C is called *optimal* if $\Phi(C)$ is an optimal binary code, i.e, the minimum distance $d(\Phi(C))$ attains certain upper bound of the minimum distance of binary codes.

In this talk, a new algorithm is presented to compute the generator polynomial of $\mathbb{Z}_2\mathbb{Z}_4$-additive cyclic codes. By using the algorithm, some new optimal additive cyclic codes are constructed.

2010 Mathematics Subject Classification: 94B05, 94B15, 94B60.
Keywords: Linear Codes, Cyclic Codes, $\mathbb{Z}_2\mathbb{Z}_4$-Additive Cylcic Codes.

CT – 052

Analysis Using BAN Logic and Syther on Asokan-Ginzboorg Protocol

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Asokan-Ginzboorg key agreement protocol describe an exchange of message which the principals involve establish shared secrets, in order to perhaps to communicate privately and secure. This protocol is kind of group key agreement which have more than 3 principals. For finding attacks on flawed group key agreement protocol, writer trying to use formal method which usually used for fixed 2 or 3 party protocols. In this paper, We describe Scyther and BAN Logic to finding protocol attack of Asokan-Ginzboorg key agreement protocol. By using scythe and BAN Logic, we can see the difference between automated tool and manual tool analysis result.

2010 Mathematics Subject Classification:
Keywords: Asokan-Ginzboorg, Formal Analysis, BAN Logic, Scyther.

CT – 053

On Unicyclic Ramsey (mK_2, P_4)-Minimal Graphs

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Finding Ramsey $(G, H)-$minimal graphs for any given graphs G and H is one of interesting problems in Ramsey Theory. Let F, G and H be simple graphs. The problem of Ramsey $(G, H)-$minimal graph is to determine a graph F such that any red-blue coloring of all edges of F contains either a red subgraph G or a blue subgraph H (it is denoted by $F \to (G, H)$), but if for each edge of F is deleted then there exists a red-blue coloring of all edges of $F - e$ such that there is no red G and no blue H as subgraphs. In this paper, for each positive integer m, we determine all unicyclic Ramsey (mK_2, P_4)-minimal graphs other than cycles.

2010 Mathematics Subject Classification: 05D10, 05C55.
Keywords: Ramsey minimal graph, matching mK_2, path P_4, unicyclic graph.

CT – 054

Implementation of Ordinary Co-Kriging Mehod for Prediction of Coal Mining Variable at Unobserved Locations Using Software R

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Kriging method is a geostatistical technique used for interpolation and contour mapping. The Ordinary Co-Kriging Method is the development of the Ordinary Kriging method involving several variables simultaneously. Co-Kriging uses information on several types of variables, namely: the main variables that have autocorrelation and cross-correlation between the main variables and all other variables, are used to make better predictions. Also in Co-Kriging it is assumed that the mean is constant but different, and determined globally.

For the case study, we use coal mining variables in the form of data quality of coal from PT. Earth Merapi that involves: coal ash, volatility, carbon, sulfur, and calories. Implementation Ordinary Co-Kriging method for prediction in unobserved locations can be done by a GStat program on software R. By using the R software calculation becomes more easily, quickly and accurately. The calculation accuracy is indicated by the Mean Average Percentage Error (MAPE) value less than 10%, and the average minimum variance error.

2010 Mathematics Subject Classification: 86A32.
Keywords: Ordinary Co-Kriging, Quality of Coal, GStat R, MAPE.

CT – 055

On Locating Chromatic Number of Mycielski Graph

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Let G be a connected graph and c a proper coloring of G. For $i = 1, 2, ..., k$ define the color class C_i as the set of vertices receiving color i. The color code of a vertex v in G is the ordered k-tuple $c_\Pi(v) = (d(v, C_1), d(v, C_2), ..., d(v, C_k))$ where $d(v, C_i)$ is the distance of v to C_i. If all distinct vertices of G have distinct color codes, then c is called a locating coloring of G. The locating chromatic number of graph G, denoted by $\chi_L(G)$ is the smallest k such that G has a locating coloring with k colors. In this paper we investigate the locating chromatic number of Mycielski graph of G.

2010 Mathematics Subject Classification: 05C12, 05C15, 05C76.
Keywords: color code, locating chromatic number, Mycielski graph.

CT – 056

SAKA-HM: A Secure Server-based Key Transport Protocol Based on Event Markers

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Abstract Key establishment protocol is an important thing to be noticed to perform a secure communication between entities. The purpose of the use of key establishment is to ensure the entities which will communicate have the keys to communicate in the sessions of communication. There are three classification of key establishment protocol. They are key transport protocol, key agreement protocol, and hybrid or authenticated key establishment protocol. In 1983, Bauer et al. proposed a key establishment protocol using event markers named Bauer-Berson-Feiertag which is categorized as server-based key transport protocol. Key transport protocol translates the session key which is used by entities to establish a secure communication, and server-based means the protocol uses the helps of server in generating the session key. Bauer-Berson-Feiertag is the refinement of Needham-Schroeder and Denning-Sacco protocol. The vulnerability of Bauer-Berson-Feiertag relies on the use of random number namely nonce which is addressed to provide the freshness service. Based on this vulnerability, we propose a new key establishment protocol which modifies the Bauer-Berson-Feiertag protocol named SAKA-HM. SAKA-HM utilizes the long-term key which are owned by the entities to encrypt the transmitted message. To examine the security of SAKA-HM protocol we use BAN logic and an automatic verification tool named Scyther to verify the security services provided by the protocol. It is proven that the modification covers the vulnerability of the previous protocol which is relies on the nonce.

2010 Mathematics Subject Classification:
Keywords: Cryptographic protocol; Key establishment protocol; Server-based key transport protocol; Bauer-Berson-Feiertag; SAKA-HM; BAN Logic; Scyther.

CT – 057

The Ramsey Number for Tree with High Maximum Degree Versus Wheel of Order Nine

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For two given graphs G and H, the *Ramsey number* $R(G,H)$ is the smallest positive integer n such that every graph F of order n, F contains G or $\overline{F}$ contains H. The Ramsey number of stars versus wheels as well as trees versus wheels have been determined in some previous papers. In 2004, Y. Chen, Y. Zhang, and K. Zhang strongly conjectured that $R(T_n, W_m) = 2n-1$ if the maximum degree of T_n is small and m is even. In this paper, we will study the Ramsey number $R(T_n, W_8)$. In particular, we consider all trees T_n of order n with the maximum degree of T_n is at least $n-3$. These trees are isomorphic to either S_n, $S_n(1,1)$, $S_n(1,2)$, $S_n(2,1)$, or $S_n(3)$. The Ramsey number $R(S_n, W_8)$ have been obtained in some previous papers. Here we show that $R(S_n(1,1), W_8) = 2n+1$ for $n \geq 5$, n odd; $R(S_n(1,1), W_8) = 2n$ for $n \geq 6$, n even; $R(S_n(1,2), W_8) = 2n$ for $n \not\equiv 3 (\mathrm{mod}\ 4)$, $n \geq 8$; $R(S_n(1,2), W_8) = 2n+1$ for $n \equiv 3 (\mathrm{mod}\ 4)$, $n \geq 11$; $R(S_n(2,1), W_8) = R(S_n(3), W_8) = 2n$ for $n \geq 8$, n even; and $R(S_n(2,1), W_8) = R(S_n(3), W_8) = 2n-1$ for $n \geq 9$, n odd.

2010 Mathematics Subject Classification: 05C55.
Keywords: Ramsey number, tree, wheel.

CT – 058

The Strong 3-Rainbow Index of Comb Product of Some Graphs

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All graphs considered in this paper are finite, simple, and undirected. We follow the terminology and notations of Diestel [**?**] for all those not defined here. Let $G = (V, E)$ be a nontrivial connected graph of order n. Define an edge h-coloring $c : E \longrightarrow \{1, 2, \cdots, h\}$, $h \in \mathbb{N}$ on G with adjency edges may be colored same. A path P is a rainbow path if no two edges of P are colored the same. Graph G is rainbow connected if every two distinct vertices are connected by a rainbow path. An edge h-coloring c under which G is rainbow connected is called rainbow h-coloring. The rainbow connection of G, denoted by $rc(G)$, is the minimum h such that G has a rainbow $h-$coloring. These concepts were introduced by Chartrand et al. in [**?**].

Rainbow connection can be applied for secure communication of information between agencies of governmet. In 2007, Ericksen [**?**] made an observation of classified information after the September 11, 2001 terrorist attacks. He stated that law enforcement and intelligent agencies could not communicate with each other through their regular channels from radio systems to databases. Although such information needed to be protected because it is critical to national security, procedures must be in place that permit access between appropriates parties. He said this condition can be addressed by assigning information transfer paths between agencies which may have other agencies as intermediaries that require a large enough number of passwords and firewalls that is prohibitive to intruders but small enough that any path between agencies has no password repeated. This situation can be modeled by a graph and studied by means of rainbow coloring.

In 2010, Chartrand et al. generalized the concept of rainbow path to rainbow tree in [**?**]. A tree T is a rainbow tree if no two edges of T are colored the same. For $S \subseteq V$, a rainbow-S tree is a rainbow tree that connects the vertices of S. Let k be a fixed integer with $2 \leq k \leq n$. Graph G is k-rainbow connected if every set S of k vertices of G, there exists a rainbow-S tree that connects them. An edge h-coloring c under which G is k-rainbow connected is called k-rainbow h-coloring. The k-rainbow index of G, denoted by $rx_k(G)$, is the minimum h such that G has a k-rainbow $h-$coloring. It is obvious that $rc(G) = rx_2(G)$. For every connected graph G of order n, it is easy to see that $rx_2(G) \leq rx_3(G) \leq \cdots \leq rx_n(G)$.

The Steiner distance of a subset S of vertices in G, denoted by $d(S)$, is the minimum size of a tree in G that connects S. Such a tree is called a Steiner S-tree or simply a Steiner tree. The k-Steiner diameter of G, denoted by $sdiam_k(G)$, is the maximum Steiner distance of S among all k-subset S of G. Then there is a simple upper bound and a lower bound for $rx_k(G)$ as follows.

Proposition 1. *[**?**] Let G be a nontrivial connected graph of order $n \geq 3$. For each integer k with $3 \leq k \leq n-1$, $rx_k(G) \leq n-1$, whereas $rx_n(G) = n-1$.*

Proposition 2. *[**?**] For every connected graph G of order $n \geq 3$ and each integer k with $3 \leq k \leq n$, $k-1 \leq sdiam_k(G) \leq rx_k(G)$.*

In this paper, we give an upper bound of strong 3-rainbow index of graphs resulted from comb product. Additionally, we determine the strong 3-rainbow index of ladders comb ladders. For simplifying, we define [a,b] = $\{x \in \mathbb{N} | a \leq x \leq b\}$.

A tree T is a rainbow Steiner S-tree or simply rainbow Steiner tree if no two edges of T are colored the same and size of T equal to Steiner distance. Graph G is strong k-rainbow connected if every set S of k vertices of G, there exists a rainbow Steiner tree that connects them. An edge h-coloring c that every k-subset has rainbow Steiner tree is called strong k-rainbow h-coloring. The strong k-rainbow index of G, denoted by $srx_k(G)$, is the minimum h such that G has a strong k-rainbow h-coloring.

Let G and H be two connected graphs. Let n be the order of G. Let o be a vertex of H. The comb product between G and H, denoted by $G \rhd H$, is a graph obtained by taking one copy of G and n copies of H and grafting the i-th copy of H at the vertex o to the i-th vertex of G.

Let m be a positive integer with $m \geq 3$. A ladder graph on $2m$ vertices, denoted by L_m, is a graph with $V(L_m) = \{u_i | i \in [1, m]\} \cup \{v_i | i \in [1, m]\}$ such that $E(L_m) = \{u_i u_{i+1} | i \in [i, m-1]\} \cup \{v_i v_{i+1} | i \in [i, m-1]\} \cup \{u_i v_i | i \in [i, m]\}$.

In the following theorem, we provide an upper bound of strong 3-rainbow index of graphs resulted from comb product.

Theorem 1. *Let $m \in \mathbb{N}$ with $m \geq 3$. Let G and H be two connected graphs with order of G is n, then $srx_3(G \rhd H) \leq srx_3(G) + nsrx_3(H)$. This bound is tight.*

In the next theorem, we provide the strong 3-rainbow index of ladders comb ladders.

Theorem 2. *Let $m \in \mathbb{N}$ with $m \geq 3$. Let L_m be a ladder graph on $2m$ vertices, then $srx_3(L_m \rhd L_m) = 2m^2 + m$.*

2010 Mathematics Subject Classification: 05C05, 05C15, 05C76.
Keywords: comb product, rainbow coloring, rainbow tree, strong 3-rainbow index.

CT – 059

Mapping Beliefs about Teaching Mathematics to the Degree of Implementation of OBE in the Undergraduate Level in an Asian University

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With the implementation of Outcomes Based Education (OBE) in the Philippines as mandated by the Commission on Higher Education (CHED), local universities are faced with many challenges with regards to its implementation. This research looked into faculty contribution to

the implementation of OBE in Mathematics subjects in the university. A mapping of teaching beliefs as espoused in teaching approaches as well as learning environments on the degree of OBE implementation is made. Data relied heavily on the questionnaires given to mathematics faculty, where the Likert-scale response system is used.

The results showed that most of the teachers perceive teacher-student focused approach to be the most effective in teaching Mathematics. Regarding the OBE system, majority understands OBE to be both student-focused and teacher- student focused approach and that it is also an interplay of the four learning environments. As to the degree of implementation, majority said that they moderately implement OBE. Lastly, the beliefs of mathematics teachers mentioned above did not correspond to the degree of their implementation of the OBE system in their classes.

2010 Mathematics Subject Classification: 97xxx.
Keywords: mathematics education, outcomes-based education, learning environments, teaching approaches,teaching beliefs.

CT – 060

On Broyden-like Simplified Iteratively Regularized Gauss-Newton Method

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Iterative regularization methods for nonlinear ill-posed equations of the form $F(a) = y$, where $F : D(F) \subset X \to Y$ is an operator between Hilbert spaces X and Y, usually involve calculation of the Fréchet derivatives of F at each iterate and at the unknown solution $a^\sharp$. In practice, a modified form of the generalized Gauss-Newton method which requires the Fréchet derivative of F only at an initial approximation a_0 of the solution $a^\sharp$ such as studied by Mahale and Nair. In this study, we dealt with a special case where $F'[a_0]$ is compact operator with known singular systems. So we propose a Broyden-like method of sIRGN. Furthermore, we studied an *a posteriori* stopping rule of Lepskij-type for the method. A numerical experiment from inverse source potential problem with compact support of perturbed disk is demonstrated.

2010 Mathematics Subject Classification: 47A52, 65J22.
Keywords: Nonlinear ill-posed problem, regularized Gauss-Newton, Broyden-like, a posteriori stopping rule.

CT – 061

User Context in Learning Mathematics Online: Coding Theory and Discrete Algebra

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We live in a very different era from 40-50 years ago. The new era of information transfer, that is the availability of internet cloud computing, Web 2.0, and the semantic web could improve the learning of mathematics.

The internet makes it possible to transfer information around the world, without distances playing a role. The cloud computing is very helpful in doing computation online, so we do not have to carry out all the computations on the devices itself. The Web 2.0 is an interactive medium where one can upload and download personal information. The semantic web is a kind of algorithm to analyze the context and the metadata so it has meaning to the user. We experience this kind of technology in Facebook [**?**] and Google's sites [**?**] for example.

For the course Coding Theory and the course Discrete Algebra, we create online exercises. We did this for several reasons. The first is to increase the productivity time for the teacher. Since he or she does not have to do tedious grading of simple exercises, he or she is free to help the students in other ways. The second is to help students study individually. In this case, the students can try and do the exercises and redo as much as they want. Moreover, they will receive immediate feedback, which is known to be more effective in learning [**?**]. Thirdly, starting the course the students can make an entrance test that gives an assessment whether the assumed foreknowledge is sufficient. Lastly, we also give small credit (1/10th of the grade) for the online exercises to motivate students to do the exercises.

Since one of the aims is to help the student in self-study and give immediate feedback, we need to make the exercises more flexible in the sense that it will not have the same exact question for the second time. One way to do this is using parameters in the exercise, so each time the exercise is opened, it will give a different instance.

There are systems like Moodle that offer parameterized questions for simple mathematics. Our subjects have more advanced mathematics, so we chose to use the MathDox system. The MathDox system has been developed at the Eindhoven University of Technology [**?**, **?**, **?**, **?**] and is a system for interactive mathematics. It is integrated with the e-learning system Moodle [**?**] in the site OnCourse [**?**]. It allows real-time computations powered by an external computer algebra systems such as Mathematica [**?**] and Maxima [**?**].

It is easy to create exercises for the MathDox system using a LaTeX format [**?**], which is easy to learn. Moreover, the system itself allows us to easily add more exercises and correct mistakes. The exercises given online are short questions that help the students understand the lecture. One example of the question is asking for a generator matrix given a parity check matrix or vice versa. in this exercise, the student is given a blank matrix so they could fill in without worrying about the format.

Based on the questionnaire following the course, many students have given positive responses about the online exercises. Most students who start with the exercises also regularly practiced for the whole course.

2010 Mathematics Subject Classification: 97C70.
Keywords: e-Learning, interactive learning, assessment system.

CT – 062

OpenMP Platform for Accelerating Computational Simulation Time of Multi-layer Shallow Water Equations

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The increasing of layer in multi-layer shallow water equations (SWE) model causes the massive number of discrete points in the discrete form. Indeed, the consequence of this problem produces high computational time for computing discrete points. The multi-layer SWE model is written as follow

$$h_t^i + \left(h^i u^i\right)_x = 0,$$
$$\left(h^i u^i\right)_t + \left(h^i (u^i)^2 + \frac{g}{2}(h^i)^2\right)_x = -gh^i \left(\sum_{k<i}^{2} \frac{\rho_k}{\rho_i} h^k + \sum_{k>i}^{2} h^k + Z + F^{fric}\right).$$

where the superscript $i \in \mathcal{L} = \{1, 2, 3, \cdots N_z\}, N_z \in \mathbb{Z}^+$ denotes the number of layer, $h(x,t)$ the water height, $u(x,t)$ the average velocity, g the gravitational force, $Z(x)$ the bottom elevation and F^{fric} the friction term. In this research the source-centered hydrostatic reconstruction scheme will be used to approximate the solution of multi-layer SWE. Moreover, several simulations to investigate the parallel performance of OpenMP in fluid flows phenomena will be given.

2010 Mathematics Subject Classification: 68U20, 68W10, 76M12, 76M25.
Keywords: OpenMP, simulation, multi-layer, shallow water, parallel performance.

CT – 063

Rainbow 2-connectivity of Edge-comb Product of A Cycle and 2-connected Graph with Diameter 2

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An edge-colored graph G is *rainbow k-connected*, if for every two vertices of G, there are k internally disjoint rainbow paths, i.e., if no two edges of each path are colored the same. The minimum number of colors needed for which there exists a rainbow k-connected coloring for G, denoted by $rc_k(G)$, is the *rainbow k-connection number* of G. In this paper, we are able

to find sharp lower and upper bounds for rainbow 2-connection number of *edge-comb product* of a cycle and 2-connected graph with diameter two.

2010 Mathematics Subject Classification:
Keywords: 2-connected graph, edge-comb product, cycle, rainbow k-connectivity, rainbow path.

CT – 064

(H_1, H_2)-supermagic Labelings on $Bead\,(H_1, H_2; e_1, e_2)$

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Let $G = (V(G), E(G))$ be a connected graphs where H_1 and H_2 are two subgraphs of G. A graph G admits (H_1, H_2)-covering, if every edge in $E(G)$ belongs to at least one subgraph of G isomorphic to H_1 or H_2. Let G admits (H_1, H_2)-covering. A graph G is called (H_1, H_2)-magic, if there are two fixed positive integer k_1 and k_2, and a bijective function $f : V(G) \cup E(G) \to \{1, 2, ..., |V(G)| + |E(G)|\}$ such that $\sum_{v \in V(H')} f(v) + \sum_{e \in E(H')} f(e) = k_1$ for every subgraph H' of G isomorphic to H_1 and $\sum_{v \in V(H'')} f(v) + \sum_{e \in E(H'')} f(e) = k_2$ for every subgraph H'' of G isomorphic to H_2. Moreover, G is said to be a (H_1, H_2)-supermagic, if $f(V(G)) = \{1, 2, ..., |V(G)|\}$. Let a, b be two fixed positive integer,

$$a \mod^* b = \begin{cases} b & \text{, where } a = kb \text{ for } k \in \mathbb{N} \\ a \mod b & \text{, where } a \neq kb \text{ for all } k \in \mathbb{N}. \end{cases}$$

A *bead* of $G_1, G_2, ..., G_k$ denoted by $bead(G_1, G_2, ...G_k; e_1, e_2, ..., e_k)$, where for every G_i there exist an $e_i = x_i^0 x_i^1 \in E(G_i)$, is a graph constructed by embedding vertex x_i^1 to $x_{(i+1) mod^* k}^0$ such that vertex v_i is formed. Let H_1 and H_2 be two nontrivial connected graphs with a fixed edge e_1 on graph H_1 and a fixed edge e_2 on graph H_2, in the case $G_i \cong H_1$ for every odd number i and $G_i \cong H_2$ for every even number i, we denote such bead by $bead\,(H_1, H_2; e_1, e_2)$. In this paper, we give a sufficient condition for $bead(H_1, H_2; e_1, e_2)$ being (H_1, H_2)-supermagic.

2010 Mathematics Subject Classification:
Keywords: (H_1, H_2)-covering, (H_1, H_2)-supermagic labeling, $bead(G_1, G_2, ...G_k; e_1, e_2, ..., e_k)$.

CT – 065

(H_1, H_2)-Supermagic Labelings on Certain Shackles of Connected Graphs H_1 and H_2 $shack(H_1, H_2, k)$

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A graph $G = (V(G), E(G))$ admits an (H_1, H_2)-covering, where H_1 and H_2 be two connected subgraphs of G, if every edge in $E(G)$ belongs to at least one subgraph of G isomorphic to H_1 or H_2. The graph G is called an (H_1, H_2)-magic, if there are two positive integers k_1 and k_2, and a bijective function $f : V(G) \cup E(G) \to \{1, 2, \ldots, |V(G)| + |E(G)|\}$ such that $\sum_{v \in V(H')} f(v) + \sum_{e \in E(H')} f(e) = k_1$ and $\sum_{v \in V(H'')} f(v) + \sum_{e \in E(H'')} f(e) = k_2$, for every subgraphs H' of G isomorphic to H_1 and for every subgraphs H'' of G isomorphic to H_2. Furthermore, it is said (H_1, H_2)-supermagic, if $f(V(G)) = \{1, 2, \ldots, |V(G)|\}$. This concept was introduced by Salman and Ashari [**?**] as a generalization of H-magic graph originated by Gutiérrez and Ladó [**?**]. Maryati et al. [**?**] showed that certain shackles of a connected graph H is H-supermagic. In 2016, Salman and Ashari [**?**] proved that some subgraph amalgamations of H_1 and H_2 are (H_1, H_2)-magic. They also found a necessary condition of $(C_n, K_{1,n})$-magic graph for any positive integer $n \geq 3$ which gave a consequence that a complete graph K_m is not $(C_n, K_{1,n})$-magic for any positive integer $n \leq m-2$. Besides that, they gave a characterization of path power graphs being $(C_3, K_{1,3})$-magic. In [**?**], Ashari and Salman proved that some shackles of H_1 and H_2 denoted by $shack(H_1, H_2, k)$ are (H_1, H_2)-supermagic for even k.
In this paper, we answer the problem from Ashari and Salman [**?**] about the existence of (H_1, H_2)-supermagic labelings on some shackles of (H_1, H_2, k) for any integer $k \geq 2$. A shackle of $G_1, G_2, , G_k$ denoted by $shack(G_1, G_2, , G_k)$ is a graph that is obtained from nontrivial connected and ordered graphs such that G_i and G_j have no common vertex for every $i, j \in \{1, 2, \ldots k\}$ with $|i - j| \geq 2$, meanwhile G_i and G_{i+1} for $i \in \{1, 2, \ldots k\}$ share exactly one common vertex called linkage vertex, where the $k - 1$ linkage vertices are all distinct. Let k be any positive integer at least two. A $shack(H_1, H_2, k)$ is the $shack(G_1, G_2, , G_k)$ where G_i isomorphic to H_1 for odd i and G_i isomorphic to H_2 for even i and $i \in \{1, 2, \ldots, k\}$. We use a $(k_1, k_2, l_1, l_2, \theta_1, \theta_2)$-balanced multiset method to prove the main theorem. A multiset is a set that allows the existence of the same elements in it. In this paper, we use the notation $[a, b]$ for $\{x \in \mathbb{N} | a \leq x \leq b\}$ and the notation $\sum X$ for $\sum_{x \in X} x$. Let k_1, k_2, l_1, and l_2 be positive integers and Y be a multiset that contains positive integers. A multiset Y is a $(k_1, k_2, l_1, l_2, \theta_1, \theta_2)$-balanced multiset, if there exist $k_1 + k_2$ subsets of Y, namely $A_1, A_2, \ldots, A_{k_1}, B_1, B_2, \ldots, B_{k_2}$, such that $|A_i| = l_1$, $|B_j| = l_2$, $\sum A_i = \theta_1$, $\sum B_j = \theta_2$ and $(\biguplus_{i=1}^{k_1} A_i) \biguplus (\biguplus_{j=1}^{k_2} B_j) = X$ for every $i \in [1, k_1]$ and $j \in [1, k_2]$. This method is a generalization of a k-balanced multiset introduced by Maryati et al. [**?**]. We give the sufficient condition of $shack(H_1, H_2, k)$ being (H_1, H_2)-supermagic in Theorem 1.

Theorem 3. *Let H_1 and H_2 be nontrivial connected graphs, and k be a positive integer with $k \geq 2$. If $shack(H_1, H_2, k)$ contains exactly $\lceil \frac{k}{2} \rceil$ subgraphs isomorphic to H_1 and $\lfloor \frac{k}{2} \rfloor$ subgraphs isomorphic to H_2, then $shack(H_1, H_2, k)$ is (H_1, H_2)-supermagic.*

2010 Mathematics Subject Classification:
Keywords: (H_1, H_2)-covering, (H_1, H_2)-supermagic, shackle.

CT – 066

Effect Of A Small Insoluble Surfactant Concentration on the Shape of a Steady Sessile Drop: Numerical And Asymptotic Approaches

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We investigate the influence of a small surfactant concentration to the shape of a steady sessile drop, more specifically to the alteration of its contact angle. We construct a model for the distribution of the surfactant at the surface and an equation for the shape of drop. The equations are then solved numerically. To validate the numerical solutions, the asymptotic solution in the limit of zero bond number is presented. Results show that a small concentration of the surfactant on the drop surface causes the value of the drop's contact angle to be bigger than the free surfactant one. For this limiting case, the asymptotic results are compared to the numerical solution and both solutions are quite in agreement.

2010 Mathematics Subject Classification: 74F25, 74G10, 74G15.
Keywords: Surfactant, Drop shape, steady state, Asymptotic approximation.

CT – 067

Finite Element Analysis of Biomagnetic Fluid Dynamics in a Stenosed Bifurcated Artery

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This paper proposed the study of biomagnetic blood flow through a stenosed bifurcated artery with the existence of applied magnetic field. The blood flow dynamics is assumed to be laminar, incompressible, two-dimensional, fully developed viscous flow in a bifurcated artery with the presence of stenosis. In addition, the magnetic field is considered to be spatially varying by taking into account the magnetization and its electrical conductivity properties while neglecting the temperature change. A simplified mathematical model of biomagnetic fluid dynamics (BFD) was developed only for isothermal case. The mathematical model is then solved numerically by using finite element method (FEM) and the computational algorithms is carried out by using Matlab software. Numerical results are presented for the effect of different values of magnetic field intensity on the blood flow characteristics. The result generally shows that the use of magnetic field affect in reducing the flow rate. It could be concluded that the practices of magnetic field in real-life problem could provide advantages especially in the

development of medical and engineering applications.

2010 Mathematics Subject Classification: 47.15.-x.
Keywords: BFD, Stenosis, Bifurcated artery, FEM.

CT – 068

On TIASL of Star Graphs

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Let X be a non-empty set. A *topology* on a set X is a collection $\mathcal{T}$ of subsets of X having the following properties: $\emptyset$ and X are in $\mathcal{T}$, the union of the elements of any sub-collection of $\mathcal{T}$ is in $\mathcal{T}$, and the intersection of the elements of any finite sub-collection of $\mathcal{T}$ is in $\mathcal{T}$. In this paper, we combine the concept of the vertex set-labeling and the set topology.

Let G be a connected, simple, and finite graph. A vertex set-labeling $f : V(G) \to \mathcal{P}(X) - \{\emptyset\}$ is called *topological integer additive set-labeling* (TIASL) of G if f is an injective function, $\{f(V(G)) \cup \{\emptyset\}\}$ is a topology of X, and there exists the corresponded function $f^+ : E(G) \to \mathcal{P}(X) - \{\emptyset\}$ such that every adjacent vertices $uv \in E(G)$ satisfies $f^+(uv) = f(u) + f(v)$. A graph G which admits TIASL is called a *TIASL graph*.

The topological integer additive set-labeling was introduced by Sudev and Hermina. They give a tight condition for a TIASL graph. They proved that G is a TIASL graph if and only if G has at least one pendant vertex. In this paper, we consider a star graphs S_n of n vertices and given set $X = \{0, 1, 2, ..., k\}$ where $k \geq 2$. We determine the order of star graph S_n admits a topological integer additive set-labeling (TIASL) with respect to a set X. We also give a condition for star graph S_n such that S_n is not a TIASL graph on set X.

2010 Mathematics Subject Classification:
Keywords: set-labeling, set topology, star graph, topological integer additive set-labeling.

CT – 069

On the Total Irregularity Strength of M-copy Cycles and M-copy Paths

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Let $G = (V, E)$ be a graph. A totally irregular total k-labeling $f : V \bigcup E \to \{1, 2, ..., k\}$ of a graph G is a total labeling such that for any different vertices x and y of G, their weights $wt(x)$ and $wt(y)$ are distinct and for any different edges x_1x_2 and y_1y_2 of G, their weights $wt(x_1x_2)$ and $wt(y_1y_2)$ are distinct. The weight $wt(x)$ of a vertex x is the sum of the label of x and the labels of all edges incident with x. The weight $wt(x_1x_2)$ of an edge x_1x_2 is the sum of the label of edge x_1x_2 and the labels of vertices x_1 and x_2. The minimum k for which a graph G has a totally irregular total k-labeling is called the total irregularity strength of G, denoted by $ts(G)$. In this paper, we determine the total irregularity strength of m-copy cycles and m-copy paths.

2010 Mathematics Subject Classification: 05C78.
Keywords: totally irregular total k-labeling, total irregularity strength, m-copy cycles, m-copy paths.

CT – 070

Numerical Simulation of Blood Flow in a 3D Bifurcated Artery with Different Geometry of Stenosis

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The formation of plaques in the bifurcated arterial wall lead to stenosis that plays an important role in the development of arterial disease due to the narrowing of blood vessel. Previous research had proven that the formation of stenosis could disturb the normal hemodynamics in blood rheology. Hence, this paper intends to investigate the influence of various geometry of stenosis in different location at parent artery to the blood flow characteristics.

The blood is modelled to be non-Newtonian generalized power law where the shear thinning characteristics of streaming blood is taken into account. In addition, the flow is describe to be three-dimensional, incompressible, unsteady and laminar. The numerical simulations are performed using COMSOL Multiphysics 5.2 which based on finite element method (FEM). The simulated results of the present model over the existing model have been validated. Analysis of the results shows that the severity of stenosis produces a considerable effect on the velocity profile and also the streamlines patterns.

2010 Mathematics Subject Classification: 47.15.-x.
Keywords: Stenosis, Generalized Power Law, 3D, Bifurcated artery and COMSOL Multiphysics.

CT – 071

The Upper Bound of Partition Dimension of The Connected Two Graph by A Bridge

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Finding the partition dimension of graph is still an open problem in the graph theory. Therefore, several reseachers investigates the problem in several operations of the graph. For example, the partition dimension of corona product, cartesian product, subdivision operation have been published by several reseachers. Let G_1, G_2 be two connevted graphs. We present the partition dimension of a graph G which is obtained from two graphs G_1, G_2 with a linking a vertex in G_1 to one vertex in G_2 (a bridge in graph G) . This paper is devoted to find the upper bound of partition dimension of the connected two graphs by a bridge.

2010 Mathematics Subject Classification: O5C12.
Keywords: partition dimension, resolving partition, bridge, graph connected.

CT – 073

Modeling The Number of Occurrences of Rainfall in Bandung Regency by Means Integrated Nested Laplace Approximation

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The accurate prediction of the rainfall intensity being an important information for the farmers, fishermen, and society in general. However, the rainfall density data is not easy to be

obtained because the limitation of the rainfall monitoring station. This problem usually solved by mining data from the satellites. One of the satellite data that can be utilized to obtain rainfall intensity data is Climate Hazard InfraRed Precipitation with Station Data (CHIRPS). CHIRPS is rainfall data that utilizes infrared waves and rain stations with 0.05^o spatial resolution (per pixel) to estimate the value of continuous rainfall in a region as well as for drought trend analysis. Another advantage of CHIRPS data is that it can present both daily and monthly rainfall. We can optimize the utilization of CHIRPS data by transforming data into frequency data and smoothing for the data to see the pattern of rainfall frequency in one year. This information can be used to predict on what day and month the frequency of rainfall will be high. The simple method can be used to extract this information is smoothing time series of Binomial data. We use Integrated Nested Laplace Approximation (INLA) to estimate the parameters smoothing. INLA is a new Bayesian techniques with very fasting computation time for any complex models.
Bandung regency is one of the districts in West Java which is often problematic with high rainfall. Flood is still the main problem that until now has not been well matched. The number of occurrences of rainfall over 1 mm in the Bandung regency area for each calendar year during 16 years (2010-15) are mined from CHIRPS data. It is of interest to estimate the underlying probability p_t of rainfall for calendar day t which is, a priori, assumed to change gradually over time. For each day $t = 1, ..., 366$ of the year we have the number of days that rained y_t and the number of days that were observed n_t. The model is given by:
First stage: A conditionally independent binomial likelihood function

$$y_t|\eta_t \sim \text{Bin}(n_t, p_t),\ t = 1, ..., 366$$

with logit link function

$$p_t = \frac{\exp(\eta_t)}{1 + \exp(\eta_t)}$$

Second stage: We assume that $\eta_t = f_t$, where f_t follows a circular random walk 2 (RW2) model with precision τ. The RW2 model is defined by

$$\Delta^2 f_i = f_i - 2f_{i+1} + f_{i+2} \sim N(0, \tau^{-1}).$$

The fact that we use a circular model here means that in this case, f_1 is a neighbor of f_{366}, since it makes sense to assume that the last day of the year has a similar effect when compared with the first day. So, in this case $x = (f_1, ..., f_{366})$ and again $x|\theta$ is Gaussian distributed.

Third stage: $\theta = (\tau)$, where

$$\tau \sim \text{gamma}(c_1, c_2)$$

Preliminary results:
We found that the number of occurrences of rainfall in Bandung Regency follows "the saddle of the horse". High number of occurrence of rainfall occurs at the beginning of the year and the end of the year. While in the mid-year (June-August) the number of occurrence of rainfall occurs is relatively low.

2010 Mathematics Subject Classification: xxx.
Bayesian, Binomial, INLA, Rainfall.

CT – 075

Linear Approximation on 5-Rounds SIMECK-32 Algorithm

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Linear attack is one of cryptanalysis technique thats applied to block cipher. It is firstly introduced by Matsui to analyze DES algorithm. In 2015, Yang et al. introduce SIMECK algorithm which is a modified block cipher produced from SIMON and SPECK algorithm. At the same year, Nasour Bagheri published his research in a paper entitled Linear Cryptanalysis of Reduced-Round SIMECK Variants. In Bagheris research, it shows the comparison between all SIMON and SIMECK variants against linear cryptanalysis, which are 14 rounds SIMECK 32/64, 19 rounds SIMECK 48/96, and 22 rounds SIMECK 64/128 algorithm by using the first algorithm also with the second algorithm in 18 rounds SIMECK 32/64, 23 rounds SIMECK 48/96, and 26 rounds SIMECK 64/128 algorithm. In this research the linear characteristic in 5 rounds SIMECK 32/64 based on Bagheris first approximation will be shown to find out whether a linear approximation with a higher bias does exist within less rounds. Linear approximation search is conducted using all bits position probability in two patterns. Pattern that is used by Bagheri in constructing linear approximation is called the first pattern and the other is the second pattern. Based on the patterns, it is discovered that by using the first pattern, 16 linear approximations are produced with the same bias value in the amount of 1/32. Hence, the probability of linear approximation can be occurred is 0, 53125. The second pattern produced 16 linear approximation with less probability in the amount of 0,51562 has the same value in each linear approximation.

2010 Mathematics Subject Classification: Mathematical Cryptography.
Keywords: linear approximation, SIMECK-32.

CT – 076

Effect of Self-Repetitive Matrix to Polygraphic Cipher Polyfunction Transformation

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The objective of this is to give an effect of self-repetitive matrix, $A_{i\times i}$ as a secret key in the system of Polygraphic Cipher Polyfunction Transformation, $C^{(t)}_{i\times j} \equiv A^t_{i\times i}P_{i\times j} \pmod M$ for any positive integer t . We examine the features of diagonal matrix, $A_{2\times 2}$ such that $A^N_{2\times 2} \equiv I \pmod M$ as a secret key that is then could be applied on self-repetitive matrix such that

$A_{i\times i}^{N+1} \equiv A_{i\times i} \pmod{M}$. Besides that, we used the Berlekamp's algorithm to factorize a polynomial congruence with prime modulo.

2010 Mathematics Subject Classification: Mathematical Cryptography and Number Theory
Keywords: self-repetitive matrix, Berlekamp's algorithm, Polygraphic Cipher.

CT – 077

On Entire Face Irregularity Strength of Plane Graphs

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We consider finite undirected graphs without loops and multiple edges. Denote by $V(G)$ and $E(G)$ the set of vertices and the set of edges of a graph G, respectively.

Motivated by total irregularity strengths defined by Chartrand, Jacobson, Lehel, Oellermann, Ruiz and Saba in [3] and a recent paper on entire colouring of plane graphs [4], Bača, Jendroľ, Kathiresan and Muthugurupackiam in [2] studied irregular labelings of plane graphs with restrictions placed on the weights of faces. A *plane* graph is a particular drawing of a planar graph on the Euclidean plane. Suppose that $G = (V, E, F)$ is a 2-connected plane graph with face set F.

For a 2-connected plane graph $G = (V(G), E(G), F(G))$ with the face set $F(G)$, they defined a labeling $\phi : V(G) \cup E(G) \cup F(G) \to \{1, 2, \ldots, k\}$ to be an *entire k-labeling*. The *weight of a face f* under an entire k-labeling ϕ, $w_\phi(f)$, is the sum of labels carried by that face and all the edges and vertices surrounding it. An entire k-labeling ϕ is defined to be a *face irregular entire k-labeling* of the plane graph G if for every two different faces f and g of G there is

$$w_\phi(f) \neq w_\phi(g).$$

The *entire face irregularity strength*, denoted by $\mathrm{efs}(G)$, of a plane graph G is the smallest integer k such that G has a face irregular entire k-labeling.

In [2] are obtained some estimations on the entire face irregularity strength and determined the precise values for graphs from three families of plane graphs.

In this talk we show the bounds of the entire face irregularity strength for disjoint union of multiple copies of a plane graph and prove the sharpness of the lower bound, see [1].

2010 Mathematics Subject Classification: 05C78.
Keywords: irregularity strength, face irregular entire labeling, entire face irregularity strength.

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CT – 078

The Modified Plant Propagation Algorithm for Optimisation Problems

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Plant propagation algorithm (PPA) is a nature-inspired algorithm that can be used to solve optimization problems. This algorithm is inspired by strawberry's propagation, hence it is also called strawberry algorithm. PPA was first introduced in 2011 by Salhi and Fraga. It has 5 parameters which are population size, number of generations, fitness function, number of stolons, and distance between runners (stolon length).
On the PPA introduced by Salhi and Fraga, its iteration stopping criterion based only on the number of generations we input. It means, that even though the population of optimum solutions has already been achieved, the iteration will still keep going as many as the determined generations. This is less effective, considering that iterative algorithms (such as PPA) should be stop when its best solution has been achieved. Therefore, it is necessary to modify Salhi and Fraga's PPA program so that the iteration stops when it already get the population of optimum solution, and one of the methods is by applying iteration stopping criterion on PPA. Thus, the iteration stops when the population of optimum solution has been achieved.
This paper explains the modification of PPA by applying Chaucy criterion as the iteration stopping criterion. In the searching of solutions using iterative algorithms with iteration stopping criterion based on Cauchy criterion, the algorithm will stop iterating when the Cauchy iterative error less than a tolerance value determined beforehand. Tolerance value is a small positive real number.
Furthermore, to validate it, we have tested both PPA program to solve several optimization problems, which are optimization problem with Griewank, Ackley, and Rastrigin function as its objective function. Computational result shows that PPA with Cauchy criterion is more effective than PPA without Cauchy criterion, because PPA with Cauchy criterion can produce optimum solution as good as PPA without Cauchy but with shorter running time.

2010 Mathematics Subject Classification: 68W06.
Keywords: Chaucy criterion, optimisation problems, PPA, stopping criterion.

CT – 079

Unsteady MHD Free Convection Flow of Casson-Nanofluid over An Oscillating Vertical Plate with Newtonian Heating

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The aim of present study is to investigate the unsteady boundary layer flow of a Casson-nanofluid past an infinite oscillating vertical plate with Newtonian heating. The governing equations are transformed to a system of linear partial differential equations using appropriate non-dimensional variables. The resulting equations are solved analytically by using the Laplace transform method and the expressions for velocity and temperature are obtained. Numerical results for velocity and temperature profiles are shown in various graphs and discussed for embedded flow parameters. It is found that velocity decreases as Casson parameters increases and thermal boundary layer thickness increases with increasing Newtonian heating parameter. A comparative study of the present results with published results provides an excellent agreement.

2010 Mathematics Subject Classification: 76R99,82D80,76W99.
Keywords: Casson-nanofluid, free convection, MHD, Newtonian heating, exact solutions.

CT – 080

Design of Diagnostic Disease System Using Support Vector Machine (SVM) Method, Artificial Neural Network Backpropagation and Learning Vector Quantization (LVQ)"

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The process of diagnosing a disease by a doctor requires high level of accuracy and expertise. Especially, for internal diseases that have several types, so it have more symptoms and characteristics. Therefore, artificial neural networks can be applied to help the process of diagnosis of Internal Disease. In this research, artificial neural networks are used to diagnose several types of Internal Diseases using Support Vector Machine (SVM), Backpropagation and

Learning Vector Quantization (LVQ) methods. Furthermore, compared the diagnosis of three methods to obtain a method with a better level of accuracy. The research data is 266 data, with 190 data as training data and 76 data as testing data that taken from RSUD Dr. M. Haulussy, Ambon. The result obtained the accuracy level of diagnosis by using SVM method is 88.16%, while by using Backpropagation and LVQ method, the accuracy rate of each method is 61.84% and 93.42%. From the results of this research can be concluded that LVQ method is considered better in diagnosing Internal Disease.

2010 Mathematics Subject Classification: 92B20.
Keywords: Artificial Neural Network, Backpropagation, Internal Disease, Learning Vector Quantization, Support Vector Machine.

CT – 081

Numerical Model for Wave Generation by Bottom Motion to Understand Tsunami Phenomena

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This paper focuses on numerical modeling for simulating wave generation as a response to bottom motion. We consider vertical and landslide bottom motion which is the common cause of tsunami. Here, depth integrated Euler equation is solved using hydrostatic scheme and non-hydrostatic scheme use staggered grid finite volume method. For vertical bottom motion, accuracy of the scheme is tested using the analytical solution and Hammack experiment. Whereas for landslide bottom motion, the result is compared with previous numerical simulation. Further, the generation of water waves as response to variety of bottom motion (moving speed, bottom geometry and bottom size) are presented and analyzed. Because the movement of the sea floor is a two-dimensional phenomena, the numerical model is extended to handle two dimensional problem.

2010 Mathematics Subject Classification: 76B15.
Keywords: non-hydrostatic model, staggered grid, wave generation.

CT – 082

Portfolio Optimization in Mean Variance and Variance with Skewness Risk Measures Using Spiral Optimization Method

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Investment is the investing a number of capital in the form of money or goods that are expected to provide benefits in the future. Therefore, investment requires diversification to reduce the level of risk without compromising the rate of return. One way that can be done is to combine several assets in a portfolio. If the investor establishes a portfolio with risk as the objective function and return be given or return as the objective function and risk be given, this problem is a single-objective (involving an objective function) portfolio optimization. If both problems are optimized, it called as a multi-objective (involving two objective functions) optimization problem with the risk of portfolio as small as possible and the return of portfolio as large as possible. In statistics, risk is expressed by the standard deviation (σ) or in the quadratic form called variance (σ^2).

This paper discusses portfolio optimization using two different risk measures, in mean variance model by Markowitz and variance with skewness model by Tun-Jen Chang et al. [1]. In the mean variance model by Markowitz [2] assumed that the distribution of portfolio return is multivariate normal, but in reality, the return of portfolio not follow a multivariate normal distribution and the return has a degree of skewness. The constraints to construct optimal portfolio in this paper are buy-in-threshold which is constraint to restrict the minimum proportion in portfolio, cardinality is a constraint to restrict the number of assets included in portfolio and roundlot is a constraint which required investors only transacting in lots.

Portfolio optimization problems will be solved by using spiral optimization method that was developed by Tamura-Yasuda in 2011 [3]. The spiral optimization method is a metaheuristic method that was built by the analogy of natural phenomena. According to Aiyoshi and Yasuda (2007) in [3], metaheuristic search strategy is an effective strategy where dynamic point search must allow diversification in the initial phase and intensification in the final phase. Diversification is a better solution search strategy by searching in a large area and intensification is a better solution search strategy in the area around intentionally good solutions.

Spiral optimization method is a good method to solve the single-objective portfolio optimization problem to some constraints such as buy-in-threshlod, cardinality and roundlot, either to minimize risk problem with return be given or maximize return with risk be given. The data used are monthly data from 38 stocks on the Index S&P Australia obtained from Yahoo Finance within the span of 5 years from March 2012-March 2017.

The problem of multi objective optimization in this paper is solved by weighted sum method, where the weights used are λ and $1-\lambda$. Each pair of weights $(\lambda, 1-\lambda)$ will give the pair of values (σ, R) with $\sigma = \sqrt{V}$ on the pareto front, where V is the variance and R is the return. The data used are monthly data from 30 stocks on the Index LQ45 obtained from Yahoo Finance within the span of 5 years from March 2012-March 2017. Spiral optimization methods can solve the multi-objective optimization problem of variance and variance with skewness, but because the dimensions used are high enough, it induces some problems such as computation time is slow, possibility of some solutions that not convergent yet or stuck at its local minimum. Furthermore, the initial point on the spiral optimization method is still less so that the resulting pareto front is less optimum. The risk and return generated by multi-objective portfolio optimization variance with skewness is lower than the mean variance. Otherwise, the time to run the program variance with skewness is longer than the mean variance. The composition of the selected stocks is the same at each given weight and the time to run.

2010 Mathematics Subject Classification: 65K065, 90C11, 90C20, 90C29.
Keywords: mean variance, multi-objective, portfolio optimization, single-objective, spiral optimization method, variance with skewness.

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CT – 084

Comparison Analysis of Rainbow Connection Number of $C_m \odot C_n$ and $C_m \odot P_n$ Graph

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Let $G = (V(G), E(G))$ be a nontrivial connected graph. A rainbow path is a path which is colored with different color of each edge. A rainbow coloring is a coloring which any two vertices can be joined by at least one rainbow path.for two different vertexes, u, v in G, geodesic path of $u - v$ is the shortest path of $u - v$. A rainbow connection number of a graph, denoted by $rc(G)$, is the smallest number of color required for graph G to be said as rainbow connected, while the strong rainbow color, denoted by $src(G)$, is the least number of color which is needed to color every geodesic path in the graph G to be rainbow. In this paper, we will determine the rc and src for $C_m \odot C_n$ graph, which will be divided into two categories : $m = 3, n \geq 3$ and $m > 3, n \geq 3$. The results will be compare with the previous research of graph $C_m \odot P_n$.

2010 Mathematics Subject Classification: Combinatorics & Graph Theory.
Keywords: rainbow connection number $C_m \odot C_n$, strong rainbow connection number $C_m \odot C_n$, corona.

CT – 085

Multiplication Semimodules Over Fully Prime Semiring

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Let R be a commutative semiring and M be a multiplication semimodules. It was showed that if $(N : M)$ is a prime ideal of R then N is a prime subsemimodule of M. The semiring

R is fully prime if every proper subsemiring is prime. In the presentation, we show that every subsemimodule of multiplication semimodules over fully prime semiring is prime by the condition of $(N : M)$.

2010 Mathematics Subject Classification: Algebra.
Keywords: Multiplication semimodule, fully prime semiring, prime subsemimodule

CT – 086

Effect of Trimmed Data in Parameter Estimation of Some Growth Models

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Logistic model, Gompertz model, Morgan-Mercer-Flodin model are usually applied to describe growth model of a population. Here, we study the effect of trimmed data on parameter estimation results of those models. We used chicken weight data cited from literature. Parameter values of the models from the complete data and the trimmed data are compared. Then, the sensitivity index of all parameters is evaluated. It was found that sensitivity order of the models from the highest sensitivity was the Morgan-Mercer-Flodin, Weibull, Gompertz and logistic model.

2010 Mathematics Subject Classification: 91B62.
Keywords: growth model, parameter estimation, chicken weight, trimmed data.
Time: July xxx, Room: xxx

CT – 087

The Total Irregularity Strength of A Complete Bipartite Graph: A Completion

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A totally irregular total k-labeling $\lambda : V \cup E \to \{1, 2, \cdots, k\}$ of a graph G is a total labeling such that for any different vertices x and y of G, their weights $wt(x)$ and $wt(y)$ are distinct, and for any different edges e and f of G, their weights $wt(e)$ and $wt(f)$ are distinct. The weight $wt(x)$ of a vertex x is the sum of the label of x and the labels of all incident edges with x, and the weight $wt(e)$ of an edge e is the sum of the label of e and the labels of both vertices incident with e. The minimum value k for which a graph G has a totally irregular total k-labeling is called the total irregularity strength of G, denoted by $ts(G)$. In [10], Tilukay *et al.* have proved that for any positive integer $n \geq 2$, a complete bipartite graph $K_{n,n}$ has a totally irregular total labeling. Completing the result in [8], this paper deals with the total irregularity strength of complete bipartite graph $K_{m,n}$ for any postitive integer m and n.

2010 Mathematics Subject Classification: 05C78.
Keywords: Complete bipartite graph, total irregularity strength, totally irregular total labeling.

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CT – 088

Spectral Collocation Method for Fractional Differential Equation via Solving A Type of Eigenvalue Problem Involving Laguerre Polynomials

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In this paper, we first derive Laguerre polynomials of abritrary degree which are the corresponding eigenfunction of a type of Sturm-Liouville eigenvalue problem. We achieve that by using Frobenius series. Then, we use the Laguerre polynomials of abritrary degree to approximate function through eigenfunction expansion. Hence, we develop an efficient scheme based on this Laguerre polynomials of abritrary degree to solve the multi-term fractional differential equations. The fractional derivative is defined in the classical Caputo sense. The properties of Laguerre polynomials of abritrary degree are utilized to change the fractional differential problems into a system of algebraic equations which can be solved easily. Some examples shown the validity and applicability of this method to solve fractional differential equations.

2010 Mathematics Subject Classification: 65L15, 65M70
Keywords: fractional differential equations, spectral method, Sturm-Liouville eigenvalue problem, Laguerre polynomials

CT – 089

Smoothing Splines, B-Splines and P-Splines Approach to Modeling Per Capita Gross Regional Domestic Product and Human Development Index of Indonesia 2015

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The measure of human development achievement with Human Development Index (HDI) is a non-instant process, but a process that requires sustained time. To maintain the sustainable human development, the necessary resources obtained from economic growth. Economic growth, which is one of the indicators to look at economic performance at both national and regional levels, is known as an increase in aggregate output (overall goods and services generated by economic activities) or Gross Domestic Product (GDP) for national and Gross Regional Domestic Product (GRDP). Knowing the closeness of HDI relationship with GRDP, this research is done by nonparametric regression analysis with Smoothing Splines, B-Splines, and P-Splines on GRDP per capita and HDI by regency/city in Indonesia in 2015. The result of the analysis shows that data distribution with fitting curve using nonparametric Smoothing Splines, B-Splines and P-Splines produce smooth curve could reach all data distribution. Comparison of MSE model Smoothing Splines, B-Splines and P-splines obtained the result that B-splines regression model for HDI and GRDP variables gave the smallest MSE value of 0.9557225 so it is the best model used to analyze the relationship of GRDP and HDI by regency/city in Indonesia in 2015.

2010 Mathematics Subject Classification: 02.50.-r.
Keywords: B-splines, Human Development Index (HDI), Gross Regional Domestic Product (GRDP), Nonparametric regression.

CT – 090

The $L(2,1)$-Labeling Number of Corona Product of K_1 and Some Certain Graphs

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An $L(2,1)$-labeling of a simple graph G is a nonnegative integer-valued function $f : V(G) \to \{0,1,2,\cdots\}$ such that, whenever x and y are two adjacent vertices in $V(G)$, then $|f(x) - f(y)| \geq 2$, and, whenever the distance between x and y is 2, then $|f(x) - f(y)| \geq 1$. The $L(2,1)$-labeling number of G, denoted $l(G)$, is the smallest number m such that G has an $L(2,1)$-labeling with no label greater than m. In this paper, we provide an upper bound and a lower bound on $L(2,1)$-labeling number of the corona product of K_1 and arbitrary graph G and an exact value on $L(2,1)$-labeling number of the corona product of K_1 and K_n. Besides that, we determine $L(2,1)$-labeling number of the corona product of K_1 and some Cartesian product graphs, which are $P_n \square P_2$, $P_n \square C_3$, and $P_n \square C_4$.

2010 Mathematics Subject Classification: 05C78.
Keywords: Cartesian product graph, complete graph, corona product graph, graph labeling.

CT – 091

The $L(2,1)$-Labeling Number of Corona Product of K_1 and Some Certain Graphs

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An $L(2,1)$-labeling of a simple graph G is a nonnegative integer-valued function $f : V(G) \to \{0,1,2,\cdots\}$ such that, whenever x and y are two adjacent vertices in $V(G)$, then $|f(x) - f(y)| \geq 2$, and, whenever the distance between x and y is 2, then $|f(x) - f(y)| \geq 1$. The $L(2,1)$-labeling number of G, denoted $l(G)$, is the smallest number m such that G has an $L(2,1)$-labeling with no label greater than m. In this paper, we provide an upper bound and a lower bound on $L(2,1)$-labeling number of the corona product of K_1 and arbitrary graph G and an exact value on $L(2,1)$-labeling number of the corona product of K_1 and K_n. Besides that, we determine $L(2,1)$-labeling number of the corona product of K_1 and some Cartesian product graphs, which are $P_n \square P_2$, $P_n \square C_3$, and $P_n \square C_4$.

2010 Mathematics Subject Classification: 05C78.
Keywords: Cartesian product graph, complete graph, corona product graph, graph labeling.

CT – 092

Ethno-Informatics for Mapping Village Naming at Maluku Island Using Data Mining

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In this paper we use data mining for ethno-informatics, the application of informatics in the culture, for mapping village naming at Maluku island. The name for a place or area provides an identity for the place or area concerned. The naming of a region has a certain meaning that can be caused by events that occurred in the past or because of the characteristics of the area or the habits of people living in the area concerned. Maluku is one of 34 provinces in Indonesia located in the southern Maluku Islands. Maluku is said to be the oldest in Indonesia, as evidenced by the records of clay tablets found in Persia. .

The purposes of this research are: how to cluster, how to visualize and how to describe the meaning of the naming villages at Maluku Island. The classification of naming villages in Maluku island based on similarity of the syllable of the Wai/Wae and Oboi prefixes using Knowledge Discovery in Database (KDD) method on data mining. The result show that the cultural character of the community can be described through the sense of naming the village on the island of Maluku.

2010 Mathematics Subject Classification: 01A07.
Keywords: ethno-informatics, KDD, data mining, naming village at Maluku

CT – 093

Solving Variable-order Fractional Partial Differential Equations Using Genocchi Wavelets-like Method

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The work witnesses that an algorithm is proposed using the Genocchi wavelets-like method for the variable-order derivative to find the numerical solutions of the linear and nonlinear fractional partial differential equations (FPDEs) of variable-order derivative. The obtained results are agree well with the existing methods. Suggested technique is highly effective, more efficient, reliable and have less computational work for variable-order derivative of FPDEs.

Illustrative examples are elaborated to expose the validity and applicability of the proposed method.

2010 Mathematics Subject Classification: 65M70
Keywords: variable-order fractional partial differential equations, Genocchi Wavelets-like Method,collocation method

CT – 094

Bogdanov Taken Bifurcation Analysis in A Predator-Prey Model with Logistic Growth using MATCONT

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In this paper, we study the numerical analysis of Bogdanov Taken Bifurcation for predator prey with constant yield predator harvesting with logistic growth model using MATCONT. The Bogdanov-Takens bifurcation point occurs in this model as the values of bifurcations parameters vary where the system has a homoclinic loop or two limit cycles. The Bogdanov Takens bifurcation curves diagram are generated numerically using MATCONT and it indicates the existence of the bifurcation by theoretical analysis for this model. The Bogdanov-Takens bifurcation diagram and the numerical simulations demonstrate that there are some parameter regions in which predator species can be driven to extinction by constant-yield harvesting of the predator.

2010 Mathematics Subject Classification: xxx.
Keywords: Bogdanov-Takens bifurcation; Predator-prey system; Limit Cycle; MATCONT.

CT – 096

A Stochastic Model on the Allocation of Premium for Sharia Life Insurance

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Based on data in 2016, approximately there were 2 million deaths in Indonesia with natural and unnatural causes. If the death happens to the breadwinner of the family, the family will suffer not only emotionally but also financially. One of the financial instruments that can

handle the financial impact due to the death is life insurance. However, the majority of society still have not believed in the insurance, as it can be seen from data that show only 11.8 % of the population has life insurance.

This paper is focused on the sharia insurance instead of the conventional insurance. According to data from the Indonesian Financial Service Authority in 2016, only 1 person in more than 1000 people has been covered by sharia life insurance. Presumably, the main issues of the people's hesitation are the relatively high premium, the unawareness of society about insurance and the inefficiency of funds allocation.

This paper develops a mathematical model for the allocation of premiums for Sharia life insurance, using Actuarial Science and some mathematical tools, for instance Monte Carlo simulation and stochastic processes. The premium paid by a participant will be allocated into the company's administration, the participant's account and the Tabarru' account. The fund from Tabarru' account collected from all participants will be used to pay claims if deaths occur. Funds from both accounts will be invested into particular industries and the investment profit will be shared between the company and the participant. From the simulation of the model using Indonesian Mortality Table, the premium allocation is affected by the changes of the age factor, the coverage period, and the administration fee. However, this allocation is not significantly affected by various conditions of the investment factor.

2010 Mathematics Subject Classification: 02.60.-x, 05.10.Gg.
Keywords: Computational Science, Monte-Carlo Simulation, Islamic Insurance.

CT – 097

Conjugation Action on the Family of Minimum $\mathcal{D}$-sets of a Finite Group

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A $\mathcal{D}$-set of a group G is a subset D of G with the property that if $x \in G \setminus D$ then $x^{-1} \in D$. The concept was introduced by Rosero et al. in 2012 and was inspired by the theory of dominating sets in graphs. In this paper, we consider only finite groups. A group's $\mathcal{D}$-sets are closely connected with involutions (elements of order 2) in the group. Clearly, every involution and the identity are contained in every $\mathcal{D}$-set.

A minimum $\mathcal{D}$-set is a $\mathcal{D}$-set that is minimum under inclusion; that is, a minimum $\mathcal{D}$-set contains every element satisfying $x^2 = 1$ and contains exactly one of x or its inverse for each element x of order greater than 2. Elementary abelian 2-groups are characterized as those groups having only one $\mathcal{D}$-set.

If D is a minimum $\mathcal{D}$-set, then so is every conjugate $D^g = g^{-1}Dg$ for $g \in G$. The conjugation action of a finite group on its family of minimum $\mathcal{D}$-sets is investigated. The main purpose of this paper is to classify the finite groups for which this action is transitive. The

main result proves that if G is a finite group, the conjugation action is transitive if and only if G is isomorphic to one of the following: (i) an elementary abelian 2-group; (ii) the dihedral group of order 6; or (iii) the dihedral group of order 8.

The proof relies on bounds on the order of G that allow for checking against a small number of groups using a published library of groups of low orders. More explicitly, let c denote the number of distinct inverse pairs $\{x, x^{-1}\}$ in G with $x \neq x^{-1}$. The number of minimum $\mathcal{D}$-sets is seen to be 2^c. Let s denote the number of solutions of $x^2 = 1$, $x \in G$. Then $|G| = s + 2c$. If G is not an elementary abelian 2-group, a result of Wall shows that $s \leq \frac{3}{4}|G|$. This gives the bound $2^c \leq |G| = s + 2c \leq 8c$ for which $c \leq 5$ is deduced. The proof is completed by a case-to-case investigation of the limited possibilities for G.

2010 Mathematics Subject Classification: 20B05, 20B10.
Keywords: $\mathcal{D}$-set, involution, conjugation, transitive action.

CT – 098

Construction of Cospectral *K-Uniform* Hypergraph

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This project deals with hypermatrix as a generalization of matrix. Family of hypermatrices conserves to be vector space as such as family of matrices. Adjacency hypermatrix is defined to accommodate adjacency matrix in a hypergraph. Then hyperdeterminant is defined from adjacency hypermatrix. Finally, polynomial characteristic is defined from there.
Properties of hypermatrix and hyperdeterminant give us knowledge about hypergraph cospectrality. Then it can be defined and determined a hypergraph is cospectral with other hypergraph or a hypergraph is determined by its spectrum.
The main result of this project is the construction of cospectral *k-uniform* hypergraph that is not isomorphic. Some *k-uniform* hypergraphs that determined by its spectrum are also mentioned in this final project. Cospectral hypergraph within this project is restricted to particular *k-uniform* hypergraph.

2010 Mathematics Subject Classification: Algebra.
Keywords: hypermatrix, hypergraph, adjacency hypermatrix, hyperdeterminan, cospectral, determined by its spectrum.

CT – 099

Distance Antimagic Labeling of Graph Products

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A graph G with order n is called distance antimagic if there exists a bijection from the set of vertices to the set of integers $1, 2, \ldots, n$ such that all vertex sums are pairwise distinct, where a vertex sum is the sum of maps of all vertices ajacent with that vertex. According to Kamatchi-Arumugam's conjecture, every graph without two vertices having the same neighborhood is distance antimagic.

In this paper, we present results on distance antimagic labeling for products of graphs. Our main tool is by arranging labels of the product graph based on their base graphs.

For corona products, graph $G \circ K_1$ is distance antimagic. Also, by choosing the maximum degree of G we can proof that $K_1 \circ G$ is distance antimagic. If G is monotone and having minimum degree at least three, $G \circ P_2$ is distance antimagic.

If G and H are regular with G is distance antimagic and H is monotone, lexicographic product $H \cdot G$ is distance antimagic. For H is not regular or not monotone, in general we not yet proof that $H \cdot G$ is distance antimagic, but there is a family of graph H that not monotone and $H \cdot G$ is distance antimagic, it is K_m. Also, there are families of graph H that nor regular and $H \cdot G$ is distance antimagic, they are P_m and W_m.

2010 Mathematics Subject Classification: combinatorics.
Keywords: distance antimagic graph, corona product, lexicographic product

CT – 100

Probability Failure Model In Mechanical Component Because Of Fatigue

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Fatigue is one of the most common mode in failure of mechanical component. Fatigue experiment shows that the coefficient of variation of fatigue life data is ranging from 30% to 40%. High deviation of the data means the deterministic prediction of fatigue life may not be valid anymore, thus a probability based method to calculate the probability of failure due to fatigue damage is conducted. The probability of failure prediction methodology is based on damage fraction concept. As the usage cycles increase, the damage fraction increases until it reaches critical damage point. It is the point where the component fails. Failure condition occur when the damage fraction is more than the critical damage. Damage fraction is a function of ultimate strength and fatigue limit, in which both are modeled as random variables with normal distribution. Case study is conducted to show the accuracy of the model. The result shows that the model has good accuracy when the standard deviation of random variable quite high.

2010 Mathematics Subject Classification: xxx.
Keywords: Failure probability, Fatigue, Damage accumulation, Damage fraction, Critical damage

CT – 101

Distance Magic Labeling Using Algebraic Approach

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Let G be a graph with order n and diameter d. Let $D \subseteq \{0, 1, 2, , d\}$ and $N_D(v) = \{u \in V(G) | d(u, v) \in D\}$, where $v \in V(G)$. A bijection $l : V(G) \to \{1, 2, , n\}$ is called D-distance magic labeling of G if there is a nonnegative integer k such that $\sum_{u \in N_D(v))} l(u) = k$ for every $v \in V(G)$. If $D = \{1\}$, D-distance magic labeling is called distance magic labeling. An eigen value of a graph G is an eigen value of its adjacency matrix. The main research in this final project is the relationship between eigen values of a graph and the existence of distance magic labeling on that graph. The graphs under consideration are regular graphs, distance-regular graphs, strongly regular graphs, line graphs of regular graphs, and graphs obtained from products of two regular graphs. Products of graphs considered are strong product, cartesian product, lexicographic product, and kronecker product.

By using eigenvalue of strongly regular graphs, necessary and sufficient conditions of strongly regular graphs having distance magic labeling are obtained. By using a matrix that has particular properties, distance magic labelings of some products of graph are obtained. By using previous results on hypercubes and by considering hypercubes as distance-regular graphs, the existence of D-distance magic labelings on hypercubes is obtained.

2017 Mathematics Subject Classification: Combinatorics.
Keywords: distance magic labeling, distance-regular graph, eigen value, strongly regular graph, line graph, hypercube, product of graph.

CT – 102

Modeling High Probability Zeros for Count Data using Zero Inflated Poisson (ZIP) Autoregression with Neighboring Effect

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Discrete time series data used to calculate the number of event in a particular area over the time. For rare event, data have many zeros. High frequency of zeros in data causes modeling

using Poisson distribution is not appropriate. Another distribution that can be used is Zero Inflated Poisson (ZIP). Correlation between frequency of event at this time can certainly be influenced by previous times. In addition, observation in a location may also be influenced by other locations. The affecting location is neighboring location that directly adjacent to modeled location. Uniform and squared inverse distance weight added to accomodate adjacent locations. As a result, model with squared inverse distance weight is best model for location with high probability zeros.

2010 Mathematics Subject Classification: xxx.
Keywords: Discrete Time Series, Count Data, Overdispersed, Neighboring Effect.

CT – 103

Improving Backpropagation Algorithm Using Parameter Optimization and Curve Smoothing for Stock Prices Prediction

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Stock exhanges play an important role in financial sector of many countries. Most of stock-brokers, who excute stock trade, use technical, fundamental or time series analysis in order to predict stock prices. The number of forecasting methods for time series data according to its historical patterns caused difficulty in the prediction process. The presence of Backpropagation Neural Network (BPNN) method is expected to adapt for every pattern of historical data. In the process of creating BPNN network, there are some parameters that must be determined. In this paper, there will be discussed about the optimization of BPNN network and the role of its parameters. After the optimization succeeded, BPNN network will be tested to predict time series data with different patterns. The obtained results were quite satisfactory. For predicting stock prices of 9 IT companies with different patterns, BPNN network could predict accurately with an average of MSE 0.3505875. Modifications of BPNN network training process are also done to increase the accuracy of predicted results, one of them was curve smoothing.

2010 Mathematics Subject Classification: 62M10, 65C50, 91B84
Keywords: backpropagation optimization, time series forecasting, artificial neural network, stock prices prediction.

CT – 104

On Graceful Trees and Beyond

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The study of graph labeling can be traced back to the graceful labeling and the well known **graceful tree conjecture**, with motivation to solve the graph decomposition problems initiated by A. Rosa and G. Ringel et al. around 1960s. A **graceful labeling** for a finite simple graph $G = (V, E)$ is an injective vertex labeling over $[0, |E|]$ such that the edge weights are pairwise distinct, where the induced edge weight is the absolute difference of two end vertex labels. The graceful tree conjecture claims that every nontrivial tree admits a graceful labeling. Moreover one may further define, as an extension, the **graceful deficiency** for a graph $G = (V, E)$ as the smallest possible integer k such that the injective vertex labeling over $[0, |E| + k]$ produces pairwise distinct induced edge weights. Note that the graceful deficiency is closely related to the optimal Golomb rulers in practical applications. In this talk, we will report the recent work regarding the graceful tree conjecture and graceful deficiency problems. Certain open problems will also be discussed.
2010 Mathematics Subject Classification:
Keywords: Graceful Labeling, Graceful Tree Conjecture, Graceful Deficiency.

CT – 105

The Metric Dimension and The Partition Dimension of Circulant Graphs

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A subset W of the vertex set of a graph G is called a resolving set of G if for every pair of distinct vertices u, v of G, there is $w \in W$ such that the distance of w and u is different from the distance of w and v. The cardinality of a smallest resolving set is called the metric dimension of G, denoted by $dim(G)$.

Let $\Pi = \{S_1, S_2, \ldots, S_k\}$ be an ordered partition of the vertex set $V(G)$ of a graph G. The partition representation of a vertex $v \in V(G)$ with respect to Π is the k-tuple $r(v|\Pi) = (d(v, S_1), d(v, S_2), \ldots, d(v, S_k))$, where $d(v, S)$ is the distance between v and a set S. If for every pair of distinct vertices $u, v \in V(G)$, we have $r(u|\Pi) \neq r(v|\Pi)$, then Π is a resolving partition and the minimum cardinality of a resolving partition of $V(G)$ is called the partition dimension of G, denoted by $pd(G)$.

The circulant graph $C_n(1, 2, \ldots, t)$ consists of the vertices v_0, $v_1, \ldots, v_{n-1}$ and the edges $v_i v_{i+j}$, where $0 \leq i \leq n-1$, $1 \leq j \leq t$ $(2 \leq t \leq \lfloor \frac{n}{2} \rfloor)$, the indices are taken modulo n.

We prove that $dim(C_n(1,2,\ldots,t)) \leq t + \frac{p}{2}$ for $n = 2tk + t + p$, where t and p are even, $t \geq 4$, $2 \leq p \leq t$ and $k \geq 1$. We show that if $t \geq 4$ is even, then there exists an infinite set of values of n such that $dim(C_n(1,2,\ldots,t)) = t$ and $pd(C_n(1,2,\ldots,t)) \leq \frac{t}{2} + 4$, and we present a few other results on the metric dimension and the partition dimension of circulant graphs.

2010 Mathematics Subject Classification: 05C12, 05C35.
Keywords: metric dimension, partition dimension, circulant graph, distance.

CT – 106

Amalgamation Decomposition and Its Computer Modelization

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A graph amalgamation is a relationship between two graphs (one graph is an amalgamation of another). Similar relationships include subgraphs and minors. Amalgamations can provide a way to reduce a graph to a simpler graph while keeping certain structure intact. The amalgamation can then be used to study properties of the original graph in an easier to understand context. Applications include embeddings, computing genus distribution, and Hamiltonian decompositions.

Decomposing a graph consist in extract smaller graphs of it. In the same way, if we want to decompose a graph Amalgamation, means that; **first** we want to know if that graph is the result of an Amalgamation of two or more graphs and **second**, if is the case, extract those graphs that form the analyzed one.

In order to make a computer model of any algorithm it has to been take in consideration different factors like; the type of the variables that are used to store the information, the containers that is being used to store the structures or the way to iterate through all these things.

The implemented algorithm provides the decomposition of Amalgamated graphs. The program is written in C++ and it uses the known BOOST graph library. In the worst case the algorithm runs in O(n) time and space, here n denotes the cardinality of the vertex set.

In this presentation we will discuss about the graph amalgamation, its decomposition algorithm and its computer modelization.

2010 Mathematics Subject Classification: xxx.
Keywords: xxx.

CT – 107

Claim Data Analysis with Generalized Linear Model

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In the insurance business, claim data have observational values that tend to be large. Therefore, to see the behavior of the insurance claims data required appropriate methods and take into account other variables which can affect the claim amount. In addition, of course, the world of insurance business needs to anticipate the claims in the future. So we need a method to predict that which in this study used Generalized Linear Model. The predictive determination of the claims in this case takes into account some predictor variables that exist in personal injury claims such as accident rate, presence or absence of legal representation, and operational time. Prediction of claim amounts will be useful as a claim backup as an anticipatory action if there is a claim event in the future. There are currently known methods for building a claim reserve. One of the most popular is the Chain-Ladder method. However, the method has not taken into account the distribution of claim amounts. In this study another alternative method will be used that is by using Generalized Linear Model. Then, method of reserving claim using Chain-Ladder method and Generalized Linear Model will be compared. The comparison showed that the raw data which directly built in the form of a run-off triangle and then using a generalized linear model for the claim reserve will generate an error and the mean square error with the smallest value compared to the other three forms of claims reserves.

2010 Mathematics Subject Classification: 62J12, 97M30, 62P05
Keywords: Generalized Linear Model, Chain-Ladder, run-off triangle, claim reserving.

CT – 108

Computing the Edge Irregularity Strength of Chain Graphs and Join of Two Graphs

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In computer science graphs are used in variety of applications, directly or indirectly. Especially quantitative labeled graphs have played a vital role in computational linguistics, decision making software tools, coding theory and path determination in networks. For a graph $G(V, E)$ with vertex set V and edge set E, a vertex k-labeling $\phi : V \to \{1, 2, \ldots, k\}$ is defined to be an *edge irregular k-labeling* of the graph G if for every two different edges e and f there is $w_\phi(e) \neq w_\phi(f)$, where the weight of an edge $e = xy \in E(G)$ is $w_\phi(xy) = \phi(x) + \phi(y)$. The minimum k for which the graph G has an edge irregular k-labeling is called the *edge irregularity strength* of G, denoted by $es(G)$.

In this paper, we determine the edge irregularity strength of some chain graphs and join of two graphs. We introduce a conjecture and open problems for researcher for further research.

2010 Mathematics Subject Classification: 05C78, 05C12
Keywords: edge irregularity strength, blocks, chain graphs, join of graphs.

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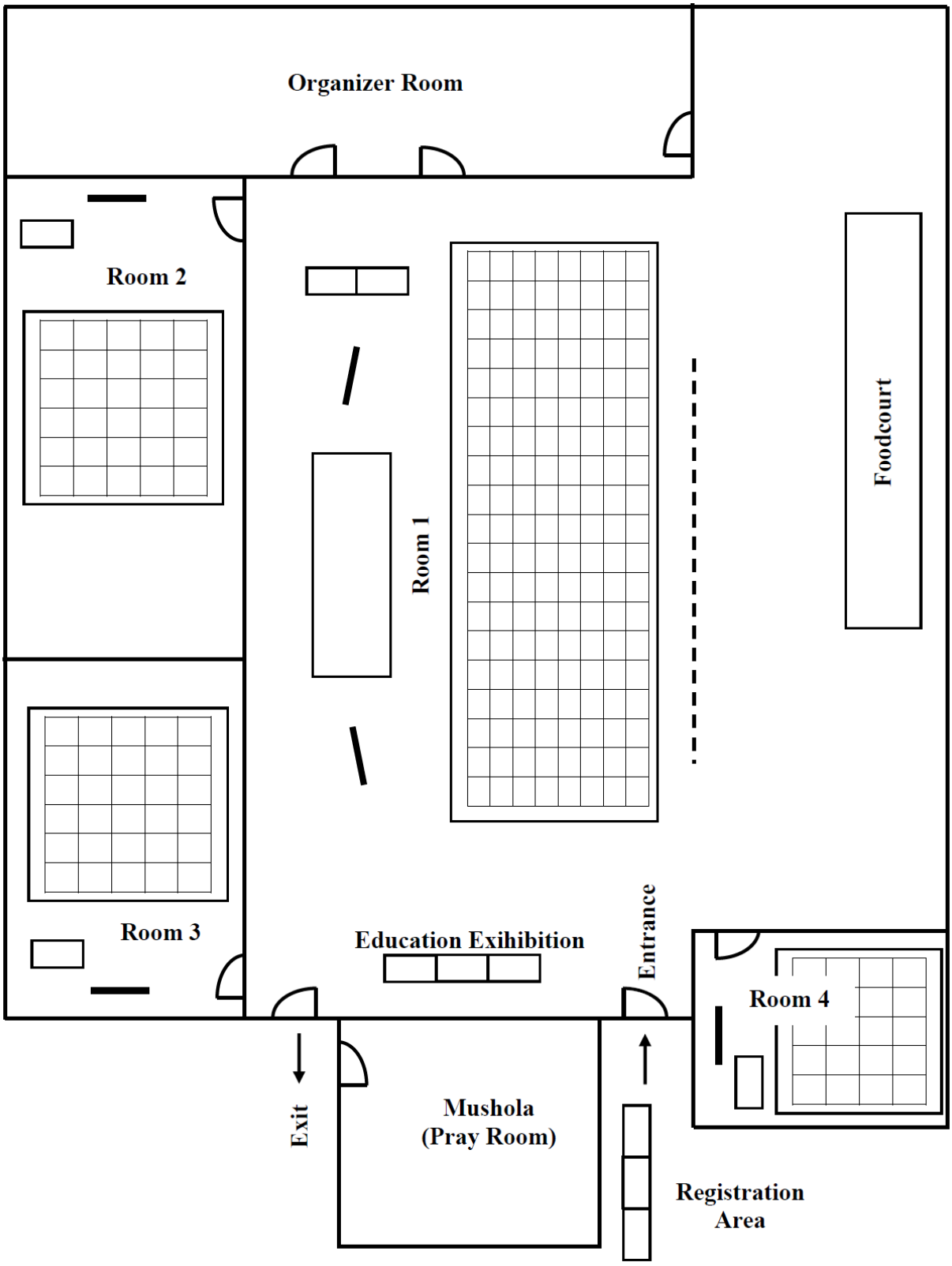
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