

AAAG MONTHLY MEETING & MOCK VIVA FOR PSM STUDENTS SEMESTER II, 2014/2015

Date/Day : Sunday, 21 June 2015
 Time : 9:40 am – 1:00 pm
 Venue : Main Meeting Room, Department of Mathematical Sciences, Faculty of Science
 (C22-310)

TENTATIVE SCHEDULE

Time	Speakers
9:40 – 10:00 am	<p style="text-align: center;">Yeo Pei Wah A NUMERICAL CALCULATION OF SOME TRIPLE INTEGRAL AND ITS APPLICATION Supervisor: Assoc Prof Dr Mukhiddin Muminov</p>
10:00 – 10:20 am	<p style="text-align: center;">Norsharmila Osman INTEGRAL EQUATIONS WITH DEGENERATE KERNEL AND SOME APPLICATIONS Supervisor: Assoc Prof Dr Mukhiddin Muminov</p>
10:20 – 10:40 am	<p style="text-align: center;">Ain Asyikin Binti Ibrahim THE CONJUGACY CLASSES OF THREE METABELIAN GROUPS AND THEIR RELATED GRAPHS Supervisor: Prof Dr Nor Haniza Sarmin</p>
10:40 – 11:00 am	<p style="text-align: center;">Nur Azura binti Noor Azhuan A VISUAL MODEL FOR COMPUTING SOME PROPERTIES OF GROUP OF INTEGERS ADDITION AND MULTIPLICATION MODULO n Supervisor: Dr Nor Muhainiah binti Mohd Ali</p>
11:00 – 11:20 am	<p style="text-align: center;">Velantina Aspah SOME OF THE DIFFERENTIAL EQUATIONS MODELS OF DENGUE FEVER DISEASE Supervisor: Assoc Prof Dr Yusof Yaacob</p>
11:20 – 11:40 am	<p style="text-align: center;">Ahmad Firdaus Yosman GEOMETRY IN PHOTOGRAPHY Supervisor: Dr Fong Wan Heng</p>
11:40 – 12:00 pm	<p style="text-align: center;">Nurul Huda Bilhikmah THE CONJUGATE GRAPH AND CONJUGACY CLASS GRAPH OF METACYCLIC 2-GROUPS OF ORDER AT MOST 32 Supervisor: Prof Dr Nor Haniza Sarmin</p>
12:00 – 12:20 pm	<p style="text-align: center;">Fadhilah binti Abu Bakar THE n^{th} COMMUTATIVITY DEGREE OF NONABELIAN 2-GROUPS WITH CYCLIC SUBGROUP OF INDEX FOUR OF ORDER 16 Supervisor: Dr Nor Muhainiah binti Mohd Ali</p>
12:20 – 12:40 pm	<p style="text-align: center;">Nur Eizyan Nazura Binti Mohd Nor SEVERAL DETERMINISTIC MODEL OF DENGUE FEVER Supervisor: Assoc Prof Dr Yusof Yaacob</p>

Organized by
Applied Algebra and Analysis Group (AAAG),
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Universiti Teknologi Malaysia, Johor Bahru, Johor
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ABSTRACT

A NUMERICAL CALCULATION OF SOME TRIPLE INTEGRAL AND ITS APPLICATION



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ABSTRACT

In this thesis, it considered a triple integral of unbounded function. First it was shown the convergence of this triple integral. It was constructed an algorithm of a numerical calculation of the triple integral: by using the properties of integral, the calculation of this triple integral reduced to the calculations of two rectangular integrals of continuous functions. Further to calculate integrals by using definition of integral. By the use of software MAPLE and C++ programming evaluated the triple integral and compared the obtained numerical results. To the end, it considered a family of discrete Schrödinger operators and proven some properties of these Schrödinger operators in Hilbert space. It is founded a condition of positivity of these operators with respect to the value of the calculated integral.

Keyword: triple, integral, MAPLE, C++, Schrödinger operators

INTEGRAL EQUATIONS WITH DEGENERATE KERNEL AND SOME APPLICATIONS



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ABSTRACT

The theory of integral equations has close contacts with many different areas of mathematics. This research are generally about the Fredholm integral equation with degenerate kernel and the spectral analysis of the lattice two-particle schrödinger operator. Within this research, we obtained the existence of solutions of non-homogeneous integral equation. Also, we obtain the condition of existence of existing of solutions for homogeneous integral equations with degenerate kernel. Applying the obtained results we get the condition of existence of the eigenvalues for two particle schrödinger operator. This study deal with linear integral equations that is, equation involving an unknown function with appears under an integral sign. Such equations occur widely in diverse areas of applied mathematics and physics. One obvious reason for using the integral equation rather than differential equations is that all the conditions specifying the initial value problems for a differential equation can often be condensed into a single integral equation. There are various method to solve an integral problem in analytic but, this study will focusing on degenerate kernel method of Fredholm integral equation problem.

Keywords: Integral equation with degenerate kernel, two-particle schrödinger operator.

THE CONJUGACY CLASSES OF THREE METABELIAN GROUPS AND THEIR RELATED GRAPHS



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Abstract

A group is called metabelian if it has an abelian normal subgroup such that the factor group is also abelian. The scope of this study includes the group of Quasihedral-16, Dihedral and Quaternion of order 16. The conjugate elements and the conjugacy classes of these groups are then applied in graph theory where the focus are the conjugate graph and conjugacy class graph. A conjugate graph is a graph that is associated with the conjugate elements of the group in which the vertices are the non-central elements of the group. Meanwhile, a conjugacy class graph of a group is a graph that is associated with the conjugacy classes of the group where the vertices are the non-central conjugacy classes of the group. Two distinct vertices of the conjugacy class graph are said to be adjacent if their cardinalities are not coprime. In this study, the conjugate elements and the conjugacy classes of the groups are obtained from their definition. The result obtained are then used in the finding of conjugate graph, conjugacy class graph and some properties of the graph which include the chromatic number, independent number, clique and dominating number. The conjugate graph and conjugacy class graph of the groups turned out to be either a line graph or a complete graph.

Keywords: Metabelian group, graph, chromatic number, independent number, clique, dominating number.

A VISUAL MODEL FOR COMPUTING SOME PROPERTIES OF GROUP OF INTEGERS ADDITION AND MULTIPLICATION MODULO n



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Abstract

This research is focused on two types of finite abelian groups which are the group of integers under addition modulo n , and the group of integers under multiplication modulo n , where n is any positive integer at most 200. The computations of some properties of the group including the order of the group, order and inverse of each element, the cyclic subgroups, list of all generators of the group and the lattice diagrams get more complicated and time consuming as n increases. Therefore, a special program is needed in the computation of these properties. Thus in this research, a program has been developed by using Microsoft Visual C++ in the Windows environment. This program enables the user to enter any positive integer at most 200 to generate answers for the properties of the groups.

Keywords : Microsoft Visual C++, group of addition and multiplication modulo n , lattice diagram, unique cyclic subgroups

SOME OF THE DIFFERENTIAL EQUATIONS MODELS OF DENGUE FEVER DISEASE



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Abstract

This study investigates the mathematical theory of dengue fever diseases which spread by the agents of virus and transmitted among people in a population. This study analyzes the deterministic model of dengue fever which involves three groups, namely the susceptible, the infective and the recovered. The deterministic model comprises of the initial value problem and a system of ordinary differential equation in a group of individuals in a population. Several method of deterministic model is included. First, a simple epidemic model is explained where it is not involving the group of recovers. Then, the general epidemic model is discussed which is more realistic in representing the real case with the combination of recovers. Next, the Susceptible-Infective-Recovered (SIR) model is discussed. The model constitutes the main transmission processes including birth rate, death rate, infection and recovery. Furthermore, host vector model describes the relationship of two populations which are the host and the vector, in the transmission of dengue diseases. Finally, the model of host vector for the mosquito's invasion is considered. In this model, dengue diseases are transmitted through aedes mosquitoes from squatter's area to housing estates. This is a differential equation model for a dengue transmission in the presence of vectors mobility to a nearby human population and it is assumed that there is no movement of human population from one cluster to the other.

Keywords : Deterministic; Simple epidemic; General epidemic; Susceptible; Infected; Recovered; Dengue; Host; Vector

GEOMETRY IN PHOTOGRAPHY



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Abstract

Geometry is known as the branch of Mathematics that revolves around the properties, measurement, and relationships of points, lines, angles, surfaces and solids; while photography is the art or practice of taking and processing photographs. Hence, in this research, geometry in photography refers to the geometrical elements that can be used and identified in photographic works. The main aim of the research is to refute the notion of Mathematics and art as two unrelated fields by discussing geometrical concepts present in photography, which include lines, curves, angles, shapes, the golden ratio, and transformations. Definitions of the aforementioned geometrical concepts were provided while examples were showcased in the form of graphical representations and photographs. Not only that, the mathematical software, MATLAB was used to computationally depict the rigid motions of transformations, namely reflection, rotation, translation and resizing. Later on, a geometrical analysis of photographs was conducted to identify the geometrical elements that exist within the photographs. In this research, it has been found that many concepts in geometry were indeed applied in photography. Therefore, it was shown that Mathematics and art were undoubtedly related to one another.

Keywords : geometry, golden ratio, photography, photographs, MATLAB

THE CONJUGATE GRAPH AND CONJUGACY CLASS GRAPH OF METACYCLIC 2-GROUPS OF ORDER AT MOST 32



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Abstract

A group is called metacyclic if it has a cyclic normal subgroup such that the quotient group is also cyclic. The classification of non-Abelian metacyclic p -groups of class two has been found by earlier researcher, which is partitioned into two families of non-isomorphic p -groups. The conjugacy classes of these groups are then applied into graph theory. The conjugate graph is a graph whose the vertices are non-central elements of a finite non-Abelian group. Besides, the conjugacy class graph is a graph whose vertices are non-central of a group that is two vertices are connected if their cardinalities are not coprime, in which their greatest common divisor between the vertices is not equal to one. In this study, the conjugacy classes of the metacyclic 2-groups of order at most 32 have been obtained using the definition of conjugacy classes and their group presentations. The conjugate graph and conjugacy class graph of metacyclic 2-groups of order at most 32 are found directly using the definition. These conjugate graph and conjugacy class graph are then used to determine some graph properties such as chromatic number, clique number, dominating number and independent number. The conjugate graph of the groups turned out to be a line graph, meanwhile the conjugacy class graph of the groups turned out to be a complete graph.

Keywords: Metacyclic group, conjugacy classes, graph, chromatic number, clique number, dominating number, independent number.

THE n^{th} COMMUTATIVITY DEGREE OF NONABELIAN 2-GROUPS WITH CYCLIC SUBGROUP OF INDEX FOUR OF
ORDER 16



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Abstract

Suppose a and b are elements of a group G . Then by considering total number of pair (a, b) for which a and b commute and then divide by the total number of pair of (a, b) which is possible. Thus the result will give the commutativity degree of a group G . Then, by considering the total number of pair (a, b) for which a^n and b commute and then divide by the total number of pair of (a, b) which is possible, thus the result is said to be the n^{th} commutativity degree of a group G . Many researchers studied about the n^{th} commutativity degree of a certain group. The commutativity degree, $P(G)$ of nonabelian 2-groups with a cyclic subgroup of index four has been done in 2015. The aim of this study is to find the n^{th} commutativity degree of the nonabelian 2-groups with a cyclic subgroup of index four of order 16. Method that have been used to calculate the n^{th} commutativity degree of those groups is by using formula involving Cayley Table and 0-1 Table.

Keywords: n^{th} commutativity degree and nonabelian 2-groups

SEVERAL DETERMINISTIC MODEL OF DENGUE FEVER



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Abstract

The purpose of this investigation is to determine the mathematical theory of infectious disease which were spread by the agent of the virus called vector and transmitted to the host in population. The main purpose of this study is to analyze the stability of several deterministic model of dengue fever that consist of three group namely susceptible, the infective and removals or recovered. The deterministic model constitutes the initial value problem and a system of ordinary differential equation in group of individuals in a population. For the simple epidemic, the closed population are applied in which there is no removal included whereas in general epidemic representing more of the real case and consist of removals such as death or isolation. Furthermore, the relationship between the host and the vector for the case of dengue fever are described by host vector model. The model considered both populations and vector are open to infection. The study also discusses on dengue transmission of population with regular visit to the mosquito breeding site. It shows that as the basic reproductive ratio increases, the endemic and the outbreak level increase.

Keywords : Dengue transmission; Dengue fever; Mosquito breeding site