

AAAG Monthly Meeting and Seminar
(Mock VIVA PhD & First Assessment Presentations)
SEMESTER II, 2015/2016

Day/Date : Sunday/ 4 April 2016
Time : 2:30 – 5:00 PM
Venue : ***T05, Seminar Room 3, Level 5***
Faculty of Science

TENTATIVE SCHEDULE

Time (PM)	Speakers
2:30 – 3:15	Mock VIVA PhD, Mustafa Anis El-sanfaz “THE PROBABILITY THAT AN ELEMENT OF A NON-ABELIAN GROUP FIXES A SET AND ITS APPLICATIONS IN GRAPH THEORY” Supervisor: Prof Dr Nor Haniza Sarmin (Main) and Dr Sanaa Mohamed Saleh Omer (Co)
3:15 – 4:00	Mock First Assessment PhD, Siti Norziahidayu Amzee Zamri “A VARIANCE OF THE PROBABILITY THAT A METACYCLIC p-GROUP FIXES A SET AND ITS RELATED GRAPHS” Supervisor: Prof Dr Nor Haniza Sarmin (Main) and Dr Sanaa Mohamed Saleh Omer (Co)
4:00 – 4:45	Mock First Assessment Master, Ahmad Firdaus Yosman “COMPUTED VARIANTS OF INSERTION AND DELETION IN FORMAL LANGUAGE THEORY” Supervisor: Dr Fong Wan Heng (Main) and Asst Prof Dr Sherzod Turaev (Co)
4:45 – 5:00	Refreshment

Organised by
Applied Algebra and Analysis Group (AAAG),
Frontier Materials Research Alliance
Universiti Teknologi Malaysia, Johor Bahru, Johor
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ABSTRACT

THE PROBABILITY THAT AN ELEMENT OF A NON-ABELIAN GROUP FIXES A SET AND ITS APPLICATIONS IN GRAPH THEORY



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Abstract

The commutativity degree, defined as the probability that two randomly selected elements of a group commute, plays a very important role in determining the abelianness of a group. In this research, the commutativity degree is extended by finding the probability that a group element fixes a set. This probability is computed under two group actions on the set namely, the conjugate action and the regular action. The set under study consists of all commuting elements of order two of metacyclic 2-groups, dihedral groups, semi-dihedral groups and quasi-dihedral groups. The probabilities found turned out to depend on the order of the set.

The results which were obtained from the probability are then linked to graph theory, more precisely to orbit graph and generalized conjugacy class graph. It is found that the orbit graph and the generalized conjugacy class graph consist of complete graphs, empty graphs and null graphs. Moreover, some graph properties such as chromatic number, clique number, dominating number and independent number are found. In addition, the necessary condition for the orbit graph and generalized conjugacy class graph to be a null graph is examined. Furthermore, two new graphs are introduced, namely the generalized commuting graph and the generalized non-commuting graph. The generalized commuting graph of all groups in the scope of this research turns out to be a union of complete K_3 graphs or null graphs, while the generalized non-commuting graph consists of K -regular graphs, empty graphs or null graphs.

Keywords: Commutativity degree, Group Theory, Graph Theory

ABSTRACT

A VARIANCE OF THE PROBABILITY THAT A METACYCLIC p -GROUP FIXES A SET AND ITS RELATED GRAPHS



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Abstract

Research on commutativity degree has been done by many authors since 1944. The commutativity degree is defined as the probability that a pair of elements in a group commute. In this research, an extension of the commutativity degree known as the probability that an element of a group fixes a set is explored. This research focuses on metacyclic p -groups where p is an odd prime and the set is the subset of all commuting elements in the group. Throughout this research, two presentations of metacyclic p -groups where p is odd prime will be used. In order to determine the probability that a metacyclic p -group fixes a set, the conjugacy classes or orbits of the group will be computed by using three group actions namely conjugate, regular and transitive actions. Besides, the probability that a metacyclic p -group fixes a set will also be determined in terms of centralizers. Moreover, the algebraic properties from the probability will be linked to

the graph theory specifically to the orbit, centralizer and isotropy graphs. Some properties of the graphs mentioned will also be discussed including the chromatic, clique, dominating and independence number.

Keywords: commutativity degree, probability that a metacyclic p -group fixes a set, group action, graph theory

ABSTRACT

COMPUTED VARIANTS OF INSERTION AND DELETION IN FORMAL LANGUAGE THEORY



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Abstract

Formal language theory is the study of syntax of formal languages and primarily used as a basis for defining the grammars of programming languages. Numerous operations in formal language theory have been studied and classified into certain classes, where one of them is the class of purely language theoretical operations that consist of the operations of concatenation, quotient, and Kleene closure. To generalize concatenation and quotient, the operations of insertion and deletion were introduced, respectively. Here, for two words v and u , the insertion of v into u adds v in any place in u while the deletion of v from u removes v from any place in u . For both insertion and deletion, there are many variants such as sequential, parallel, iterated,

controlled, and scattered. In this research, a new variant is introduced, namely computed insertion and deletion, which is obtained by imposing some restrictions on the rules of the systems. In this presentation, the research background, literature review, research methodology and the status of the research are presented. Some preliminary results will also be shown.

Keywords: insertion, deletion, computed insertion system, Formal Language Theory
