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COMMUTATIVITY DEGREE AND GRAPHS RELATED TO CONJUGACY CLASSES OF SOME NON-ABELIAN GROUPS

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Abstract: Let G be a finite group. The commutativity degree of G is the probability that two randomly chosen elements of the group commute. This paper explores the commutativity degrees and the properties of graphs relating to conjugacy classes associated with various group and group products, focusing on dihedral, generalized quaternion, and symmetric groups. We find that the conjugacy class graph of $Q_{4n} \times Q_{4m}$ and $S_n \times S_m$ are connected and non-planar. Furthermore, we examine the generalized conjugacy class graphs of generalized dihedral and generalized quaternion group, providing insights into their graph structures and connectivity properties. Our findings highlight the intricate relationships between group elements, their conjugacy classes, and the resulting graph-theoretic representations.

Keywords and Phrases: Conjugacy class graph, generalized conjugacy class graph, non-abelian group, dihedral group, generalized quaternion group, symmetric group.

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1. Introduction

The study of finite groups and their properties is a fundamental topic in algebra, with significant applications in various fields. One intriguing aspect of group theory