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**Master Thesis Defense**

Entitled

*FAITHFUL REPRESENTATION OF FREE GROUPS AND CONGRUENT SUBGROUPS OF* $SL_3(Z)$

by

Julius Kurian

Faculty Advisor

Dr. Alexandr Zubkov, Department of Mathematical Sciences

College of Science

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(the link to the online session : https://uaeu.blackboard.com/webapps/collab-ultra/tool/collabultra?course_id=_163461_1 )

Abstract

This thesis is concerned with the matrix representation of a free non-abelian group by matrices of size $\geq 3$. We proceed from defining an equivalence classes and then transitioning to free groups. We discuss in details the group $G_n(k)$ which is the group generated by the matrices filled with first, (second, etc.) column, except for the intersection with the diagonal, and we have ones on the diagonal and zeros at the other places. The filled places are occupied by the same parameter $k$. An alternative proof for the known fact that $G_n(3)$ is not *free* is provided. The main objective of this thesis is to find a lower bound for the parameter. An explicit value of the lower bound is found which is a refinement of a previous lower bound.

**Keywords:** free group, equivalence classes, Mennicke subgroup, congruence subgroup, principal congruence subgroup.