Matrix Group

# Presentation Assignment

**Presenter:** Saurav Awasthi
**Date:** November 27, 2025
**Duration:** 30 minutes

### Presentation Instructions

- The presentation contains 20 points. It is divided into three parts. The content contains 12 marks, whereas the presentation and the question answer contain 6 marks.
- The time limit is strict. You may take at most 5 minutes extra. So, in any case, try to wrap up your talk by 35 minutes.

## Presentation Topic

### Center in $GL(n, \mathbb{K})$

Recall that the center of $G$ is the subgroup $Z(G)$ consisting of all elements $h \in G$ such that $gh = hg$ for all $g \in G$. The main aim of this presentation will be to study the center of the set of invertible matrices. Let $GL(n, \mathbb{K})$ denotes the set of all matrices with positive determinant.

### Problem

1. The center of $GL(n, \mathbb{K})$ is the group of scalar matrices. That is, $Z(GL(n, \mathbb{K})) = \mathbb{K}^\times$
2. The multiplication map $\varphi : (\mathbb{R}_+^\times, \cdot) \times SL(n, \mathbb{K}) \to GL(n, \mathbb{K})_+$ is a group homeomorphism and a group isomorphism, that is, a isomorphism of topological groups.

3. For special linear groups, $SL(n, \mathbb{K})$, find the center.

*Good luck with your presentation! If you have any questions, please don't hesitate to reach out.*