Matrix Group

Presentation Assignment

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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

$SO(n, \mathbb{R})$ is path connected

Recall that $SO(n, \mathbb{R})$ is the set of all orthogonal matrices with determinant 1. The goal is to prove that $SO(n, \mathbb{R})$ is path-connected.

Problem

1. For $n \leq 3$, use geometry or some homeomorphism to show that $SO(n)$ is path-connected.
2. You may use some decomposition to show that for $n \geq 4$, the matrix group $SO(n)$ is path-connected.

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