

EE2100: Matrix Theory**Assignment - 9****Handed out on 07 - Oct - 2023****Due on 17 - Oct - 2023 (before 5 PM)****Instructions :**

1. Please submit the solutions to the assignment problems to the course page (on the canvas platform). Solutions submitted to the course page will only be evaluated. Refer to the assignment guidelines mentioned on the course page.
 2. Submissions received after the deadline will attract negative marks.
 3. It is suggested that you attempt all the questions (preferably the ones indicated using *). However, submitting solutions for problems totalling at least 10 points is sufficient.
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1. *(10 Points) Using a programming language of your choice, develop a code that can compute the determinant of a square matrix.

Note: The developed code must not use any built-in libraries available in the programming language.

2. (5 points) Prove that for any $\mathbf{A} \in \mathbb{R}^{2 \times 2}$, $\mathbf{A}^2 = \text{Tr}(A)\mathbf{A} - \text{Det}(A)\mathbf{I}$, where $\text{Tr}(\cdot)$ is the trace of a matrix and $\text{Det}(\cdot)$ is the determinant of a matrix
3. (5 points)** Prove that the probability that $\text{Tr}(\mathbf{ABAB}) > \text{Tr}(\mathbf{A}^2\mathbf{B}^2)$ is equal to the probability that $\det(\mathbf{AB} - \mathbf{BA}) < 0$.
4. (5 points) Prove that the determinant of an upper triangular matrix is the product of its diagonal entries.