

Worksheet

Part 1. Singular Matrix Norms

The norm of a singular matrix is 0.

- (A) True
- (B) False

Part 2. LU Existence

Provided row interchanges are allowed, an LU factorization always exists for an $n \times n$ matrix A .

- (A) No.
- (B) Yes.

Part 3. Permutation Matrices

You are given a shuffled 5×5 matrix S like so

$$\begin{bmatrix} 20 & 21 & 22 & 23 & 24 \\ 15 & 16 & 17 & 18 & 19 \\ 5 & 6 & 7 & 8 & 9 \\ 0 & 1 & 2 & 3 & 4 \\ 10 & 11 & 12 & 13 & 14 \end{bmatrix}$$

Create a 5×5 permutation matrix P such that $PS = A$ where A is

$$\begin{bmatrix} 0 & 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 & 9 \\ 10 & 11 & 12 & 13 & 14 \\ 15 & 16 & 17 & 18 & 19 \\ 20 & 21 & 22 & 23 & 24 \end{bmatrix}$$

```
import numpy as np
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