

# 25MT103: Linear Algebra

## Unit 1: Matrices

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## Matrices - Tutorial

# Syllabus

- ➡ Elementary row and column operations
- ➡ Elementary Matrices
- ➡ Similar Matrices
- ➡ Echelon form
- ➡ Row reduced echelon form
- ➡ Rank of a matrix
- ➡ Inverse of a matrix by Gauss-Jordan Method
- ➡ LU decomposition

- 1 Determine the rank of the matrix:

$$\begin{bmatrix} -1 & -2 & -1 \\ 2 & 4 & 3 \\ 3 & 6 & 3 \end{bmatrix}$$

# Upper Triangular Matrix

- 1 Reduce the matrix to upper triangular form

$$A = \begin{bmatrix} -2 & -1 \\ -4 & -3 \end{bmatrix}.$$

# Decompose to LU form

- 1 Decompose the matrix into LU form

$$A = \begin{bmatrix} 4 & 3 \\ -1 & 1 \end{bmatrix}.$$

# Gauss–Jordan elimination

- 1 Show the steps of Gauss–Jordan elimination to find the inverse of the matrix

$$A = \begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}.$$

## A few more...

- 1 For the matrix  $B = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{bmatrix}$  compute its LU decomposition (if possible) and its determinant.
- 2 Use Gauss–Jordan to find the inverse of  $C = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \\ 2 & 3 & 1 \end{bmatrix}$ .
- 3 Explain the relationship between the rank of  $A$  and the solution set of  $Ax = 0$ .

# Thank You!

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I can't change the direction  
of the wind, but I can adjust  
my sails to always reach  
my destination.

(Jimmy Dean)

