

# Lab Assignment 2

1. How to find a norm of a vector? write a python code for general **p-norm**.
2. How to compute the **angle** of two vectors?
3. Write a Python code to **normalize** a vector.
4. Write a program to compute the **transpose** of a given matrix.
5. Set up three functions corresponding to the following **elementary operations**:
  - 1) Multiply any row by non-zero number
  - 2) Add two rows and exchange one of the original rows with the result of the addition
  - 3) Swap rows
6. Write a program to compute the **rank** of a matrix using **Gaussian elimination**.

$$A = \begin{bmatrix} 2 & 4 & 1 & 3 \\ 1 & 2 & 3 & 1 \\ 3 & 6 & 4 & 4 \\ 2 & 4 & 2 & 5 \end{bmatrix}$$

7. Write a program to compute the solution of the following system of linear equations

Take the following example:

$$A = \begin{bmatrix} 2 & -1 & 1 & 1 \\ 1 & 2 & -1 & -1 \\ -1 & 2 & 2 & 2 \\ 1 & -1 & 2 & 1 \end{bmatrix} \quad b = [6, 3, 14, 8]$$

8. Write a program to compute the **inverse** of a  $n \times n$  (general) matrix.
9. Write a program to compute the **determinant** of a  $n \times n$  matrix, and then extend it to find out the eigen values of matrices using determinant function.