Assignment#2

Elimination Method

1. Solve to solve the following equations using **Gauss Elimination Method**:

$$10x1 - 7x2 + 3x3 + 5x4 = 6$$
$$-6x1 + 8x2 - x3 - 4x4 = 5$$
$$3x1 + x2 + 4x3 + 11x4 = 2$$
$$5x1 - 9x2 - 2x3 + 4x4 = 7$$

[**Ans:** x1 = 5, x2 = 4, x3 = -7, x4 = 1]

1. Solve to solve the following equations using **Gauss Elimination Method with Partial Pivoting & Complete Pivoting** strategies, comment on the result.

$$x + 2y - 12z + 8v = 27$$
$$5x + 4y + 7z - 2v = 4$$
$$-3x + 7y + 9z + 5v = 11$$
$$6x - 12y - 8z + 3v = 49$$

[**Ans:** x = 3, y = -2, z = 1, v = 5]

2. Write the *pseudo-code* of **Gauss-Jordan Method** to solve the linear system AX = B.
3. Solve to solve the following equations using **Gauss-Jordan Method**:

$$10x1 - 7x2 + 3x3 + 5x4 = 6$$
$$-6x1 + 8x2 - x3 - 4x4 = 5$$
$$3x1 + x2 + 4x3 + 11x4 = 2$$
$$5x1 - 9x2 - 2x3 + 4x4 = 7$$

[**Ans:** x1 = 5, x2 = 4, x3 = -7, x4 = 1]

4. Using **Gauss-Jordan Method**, find the inverse (A^{-1}) of the matrices:

a. $\begin{bmatrix} 2 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$ b. $\begin{bmatrix} 2 & -2 & 4 \\ 2 & 3 & 2 \\ -1 & 1 & 1 \end{bmatrix}$ c. $\begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$

5. Use **Matrix Inversion Method** to solve the following equations:

$2x1 - x2 + 4x3 = 10,\ 2x1 + 5x2 - x3 = 7, x1 + 2x2 + 10x3 = -7$ [x1 = 5, x2 = 4, x3 = -7]

6. Solve the following system of equations using **Crout LU Factorization Method**:

$$5x1 + 2x2 + 3x3 = 31,\ 3x1 + 3x2 + 2x3 = 25, x1 + 2x2 + 4x3 = 25$$

7. Solve the following system of equations using **LU Decomposition Method**:

$$x - 3y + 10z = 3, -x + 4y + 2z = 20, 5x + 2y + z = -12$$

8. Solve the following system of equations using *suitable iterative method*:

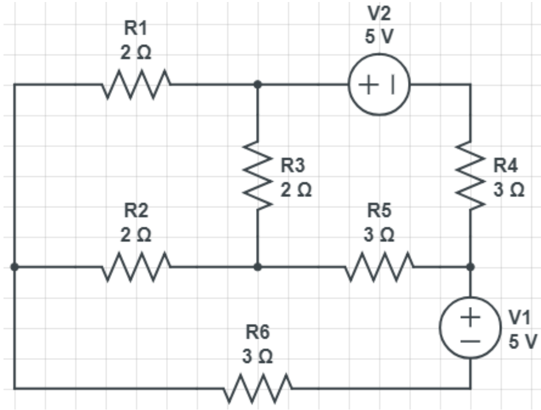
$$20x + y - 2z = 17,\ 3x + 20y - z = -18, 2x - 3y + 20z = 25$$

9. Solve the system of equations for currents I1, I2, I3 using **Gauss Elimination** or **Gauss Jordan Method**.

$$R6 * I1 + R5 * (I1 - I2) + R2 * (I1 - I3) = V1$$

$$R4 * I2 + R3 * (I2 - I3) + R5 * (I2 - I1) = V2$$

$$R1 * I3 + R2 * (I3 - I1) + R3 * (I3 - I2) = 0$$



Iterative Method

1. Solve the following system of equations using
   i. **Gauss-Jacobi Iteration Method**, correct to 3-decimal places
   ii. **Gauss-Seidel Iteration Method**, correct to 5-decimal places & comment on the result.

$$10x1 - 2x2 - x3 - x4 = 3$$
$$-2x1 + 10x2 - x3 - x4 = 15$$
$$-x1 - x2 + 10x3 - 2x4 = 27$$
$$-x1 - x2 - 2x3 + 10x4 = -9$$

2. Apply **Gauss-Seidel Iterative Method** to solve the following linear equations, correct to 2-decimal places.

$$10x + y - z = 11.19$$
$$x + 10y - z = 28.08$$
$$-x + y + 10z = 35.61$$

Eigen Value & Eigen Vector using Power Method

1. Find the *Largest* **Eigen Value** & corresponding **Eigen Vector** using **Rayleigh's Power Method**.

a. $\begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 4 & 4 \\ 4 & 1 & 8 \\ 4 & 8 & 1 \end{bmatrix}$ c. $\begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$

2. Write an *algorithm* & *pseudo-code* to determine the dominant **Eigen Value** and corresponding **vector** of a square using Power Method.