**Assignment 1 (Chapter 1 and 2)**

**Question 1**

Determine whether either of the points (1, –1) and (2, 1) is a solution to the given system of equations.

$$\begin{aligned} 2x - y &= 3 \\ x + 3y &= 5 \end{aligned}$$

**Question 2**

Solve the following systems of linear equations:

a) $\begin{aligned} x - y &= 2 \\ 2x - 2y &= 4 \end{aligned}$

b) $\begin{aligned} x - y &= 1 \\ x - y &= 3 \end{aligned}$

**Question 3**

Compute the determinants using cofactor expansion along the first row

a)

$$\begin{vmatrix} 1 & 0 & 3 \\ 5 & 1 & 1 \\ 0 & 1 & 2 \end{vmatrix}$$

b)

$$\begin{vmatrix} 1 & -1 & 0 \\ -1 & 0 & 1 \\ 0 & 1 & -1 \end{vmatrix}$$

**Question 4**

Find the inverse of the matrix below.

a)

$$\begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$$

b)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{bmatrix}$$

**Question 5**

Solve the given system of equations using Gaussian Elimination

a)

$$\begin{aligned} x_1 + 2x_2 - 3x_3 &= 9 \\ 2x_1 - x_2 + x_3 &= 0 \\ 4x_1 - x_2 + x_3 &= 4 \end{aligned}$$

b)

$$\begin{aligned} x_1 + x_2 + 2x_3 &= 8 \\ -x_1 - 2x_2 + 3x_3 &= 1 \\ 3x_1 - 7x_2 + 4x_3 &= 10 \end{aligned}$$

**Question 6**
Solve the given system of equations using Gauss-Jordan elimination

a)

$$\begin{aligned} x_1 - 3x_2 - 2x_3 &= 0 \\ -x_1 + 2x_2 + x_3 &= 0 \\ 2x_1 + 4x_2 + 6x_3 &= 0 \end{aligned}$$

b)

$$\begin{aligned} 2r + s &= 3 \\ 4r + s &= 7 \\ 2r + 5s &= -1 \end{aligned}$$

**Question 7**
Solve the following system using:

a) Doolittle
b) Crout

$$\begin{aligned} 2x + y + 4z &= 12 \\ 8x - 3y + 2z &= 20 \\ 4x + 11y - z &= 33 \end{aligned}$$

**Question 8**
Find the distance between **u** and **v** below

u = $\begin{vmatrix} \sqrt{2} \\ 1 \\ -1 \end{vmatrix}$ , v = $\begin{vmatrix} 0 \\ 2 \\ 2 \end{vmatrix}$

**Question 9**
Let u = (2, 1, 2) and v = (3, 3, 1). Find

a) u **.** v
b) u x v

**Question 10**

a) Determine whether v = (1, -2, 5) in $R^3$ is a linear combination of the following vectors

$u_1 = (1, 1, 1)$, $u_2 = (1, 2, 3)$, $u_3 = (2, -1, 1)$

b) Determine whether the vectors in $R^3$, u = (1, 2, 5), v = (2, 5, 1), w = (1, 5, 2) are linearly independent?