

Assignment 1

Systems of Linear Equations

1. Find the solution of these systems of linear equations using elementary row operations:

$$\begin{aligned} x + 3y - 5z &= -9 \\ \text{a. } x - 2y + 4z &= 15. \\ 2x + y + z &= 8 \end{aligned}$$

$$\begin{aligned} x - 3y + 4z &= 9 \\ \text{b. } 3x + 2y + 2z &= 20. \\ 5x - y - 3z &= -5 \end{aligned}$$

$$\begin{aligned} x - y + z - w &= 0 \\ \text{c. } x + 3y + 9z + 27w &= 0. \\ 8x - 4y + 2z - w &= 0 \end{aligned}$$

$$\begin{aligned} x + y + z + w &= 1 \\ \text{d. } x + 2y + 3z + 4w &= 5 \\ x + 4y + 9z + 16w &= 25 \\ x + 8y + 27z + 64w &= 125 \end{aligned}$$

$$\begin{aligned} x + y + z + w &= 2 \\ \text{e. } x - y + z - w &= 10 \\ x + 2y + 3z + 4w &= 0 \\ 4x - 3y + 2z - w &= 30 \end{aligned}$$

2. Find the solution of these systems of linear equations simultaneously using elementary row operations:

$$\begin{aligned} x + 3y &= 3 \\ \text{a. } 3x + z &= 0, \\ y + 3z &= 1 \end{aligned}$$

$$\begin{aligned} x + 3y &= 1 \\ \text{b. } 3x + z &= 13, \\ y + 3z &= 2 \end{aligned}$$

$$\begin{aligned} x + 3y &= 6 \\ \text{c. } 3x + z &= 13. \\ y + 3z &= 13 \end{aligned}$$

3. Given a system of linear equations:

$$\begin{aligned} 3x + 2y + z &= 10 \\ 2x + y + 5z &= 19, \\ x + y - a^2z &= 6a + 3 \end{aligned}$$

where a is a constant.

- If $a = 2$, does the system consistent? If yes, find the solution. If no, explain the reason.
- If $a = 0$, does the system consistent? If yes, find the solution. If no, explain the reason.
- If $a = -2$, does the system consistent? If yes, find the solution. If no, explain the reason.