1. Solve the following system of equations.

$$\begin{aligned} 2x_1 - x_2 + 4x_3 &= 1 \\ 5x_2 + 2x_3 &= -1 \\ -3x_3 &= 2 \end{aligned}$$

2. Solve the following system of equations. If necessary, express the general solution parametrically.

a) $\begin{aligned} -8x_1 + 2x_2 &= 1 \\ x_1 - \frac{1}{4}x_2 &= -1 \end{aligned}$ $b)$ $\begin{aligned} 3x_1 + 6x_2 - 3x_3 &= 6 \\ -2x_1 - 4x_2 - 3x_3 &= -1 \\ x_1 + 2x_2 - 6x_3 &= 5 \end{aligned}$ c) $\begin{aligned} x_2 + 2x_3 &= 6 \\ x_1 + 2x_2 + 5x_3 &= 13 \\ x_1 \quad + 2x_3 &= 4 \end{aligned}$

3. What is the solution set of the linear system whose augmented matrix is given below?

$$\left[\begin{array}{ccccc|c} 1 & 0 & 0 & 1 & -1 & 2 \\ 0 & 1 & 0 & -1 & 2 & 1 \\ 0 & 0 & 1 & 2 & -3 & 0 \end{array}\right]$$

4. State whether each matrix is in row echelon form, reduced row echelon form, or neither.

a) $\begin{bmatrix} 1 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix}$ $b)$ $\begin{bmatrix} 1 & 0 & 0 & 4 & -1 \\ 0 & 0 & 1 & 5 & 2 \\ 0 & 1 & 0 & 0 & -1 \end{bmatrix}$ $c)$ $\begin{bmatrix} 1 & 1 & 0 & 4 & 2 \\ 0 & 1 & 1 & 5 & 6 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 3 \end{bmatrix}$ $d)$ $\begin{bmatrix} 1 & -2 & 0 & 1 & -1 \\ 0 & 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

5. Determine, with reason, whether each statement is true or false.

a) The equation $x - \sqrt{3}y + 4z - 8w = 0$ is linear.

b) A system of linear equations can have exactly four solutions.

c) If a linear system is consistent, then it has exactly 1 solution.

d) A 7×3 matrix has 7 columns.