

1. How many solutions does the following linear system have?

$$x + y + z = 10$$

$$x + 2y + 3z = 9$$

- (A) None.
- (B) Exactly one.
- (C) Infinitely many.

2. Let  $k$  be a constant and consider the following linear system with 2 variables and 2 equations.

$$x - y = 1$$

$$3x - 3y = k$$

Which of the following situations is impossible, no matter what the value of  $k$  is?

- (A) The system having no solutions.
- (B) The system having exactly one solution.
- (C) The system having infinitely many solutions.
- (D) None of the above.

3. A linear system has 3 variables and 2 equations. Which of the following situations is impossible?

- (A) The system having no solutions.
- (B) The system having exactly one solution.
- (C) The system having infinitely many solutions.
- (D) None of the above.

4. You're given a linear system of equations. After row reducing, you find that there's a row of all 0's. Which of the following is impossible?

- (A) The system having no solutions.
- (B) The system having exactly one solution.
- (C) The system having infinitely many solutions.
- (D) None of the above.

5. True or False?

The vector  $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$  is in the set

$$\left\{ x \begin{pmatrix} -1 \\ 3 \end{pmatrix} : x \in \mathbb{R} \right\}.$$

6. True or False?

The line through  $(1, 1, 0)$  and  $(10, -1, 4)$  in  $\mathbb{R}^3$  contains the vector  $(0, 2, 1)$ .

7. True or False?

The vector  $\begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$  is in the set

$$\left\{ \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix} + x \begin{pmatrix} -1 \\ 3 \\ 1 \end{pmatrix} + y \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} : x, y \in \mathbb{R} \right\}.$$

8. How many functions of the form  $f(x) = ax^2 + bx + c$  satisfy  $f(-1) = 1$  and  $f(1) = 2$ ?

- (A) None.
- (B) One.
- (C) Two.
- (D) Infinitely many.