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

$$\begin{aligned} x + y + z &= 10 \\ x + 2y + 3z &= 9 \end{aligned}$$

(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. True or False?

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

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

4. True or False?

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

5. True or False?

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

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

6. 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.

7. Consider the following line L and plane P inside $\mathbb{R}^3$.

$$L = \left\{ \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix} + x \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} : x \in \mathbb{R} \right\}$$

$$P = \left\{ y \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix} + z \begin{pmatrix} 0 \\ 4 \\ 1 \end{pmatrix} : y, z \in \mathbb{R} \right\}$$

Which of the following describes the intersection of L and P?

(A) There is no point of intersection.

(B) There is a single point of intersection.

(C) There is a line of intersection.

8. 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.

9. 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.