

## Week 01 IVLE Quiz

1. If I write down a general solution for the linear system below, what is the number of arbitrary parameters that will be required?

$$\begin{cases} x_1 + x_2 + x_3 + x_4 + x_5 = 1 \\ \phantom{x_1 + x_2 + } x_3 + x_4 + 2x_5 = 0 \\ \phantom{x_1 + x_2 + x_3 + x_4 + } x_5 = 3 \end{cases}$$

- (A) 1  
(B) 2  
(C) 3  
(D) Cannot be determined. More information is required.

**Answer:** (B)

2. Which of the following statements are correct?

- (I) A plane and a line in the  $xyz$ -space always intersect at exactly one point.  
(II) The equation  $a_1x + a_2y + a_3z = b$  represents a line in the  $xyz$ -space when exactly one of  $a_1, a_2, a_3$  is equals to zero.  
(III) The solution set of a linear system with two equations and three variables  $x, y, z$  is always non empty.

- (A) None of the statements are correct.  
(B) Only (II) is correct.  
(C) Only (I) and (II) are correct.  
(D) Only (III) is correct.

**Answer:** (A)

3. Let  $\mathbf{A}$  be an augmented matrix representing a linear system with 4 equations and 5 variables. How many of the following are elementary row operations that can be performed on  $\mathbf{A}$ ?

- (I) Multiply the first row of  $\mathbf{A}$  by  $\pi$ .  
(II) Add 2 times the first row of  $\mathbf{A}$  to 5 times the second row of  $\mathbf{A}$ .  
(III) Add  $-1$  times the third row of  $\mathbf{A}$  to the fifth row of  $\mathbf{A}$ .  
(IV) Subtract 2 times of the first row of  $\mathbf{A}$  from the second row of  $\mathbf{A}$  and then multiply the second row of  $\mathbf{A}$  by 2.

- (A) Exactly one.  
(B) Exactly two.

(C) Exactly three.

(D) All four.

**Answer:** (A)

4. Which of the following statements on row equivalent matrices is/are correct? For statement (III), a square matrix is one where the number of rows and columns is the same.

(I) If  $\mathbf{A}$  and  $\mathbf{B}$  are row equivalent, then  $\mathbf{A}$  and  $\mathbf{B}$  must have the same number of rows.

(II) If  $\mathbf{A}$  is row equivalent to  $\mathbf{B}$  and  $\mathbf{B}$  is row equivalent to  $\mathbf{C}$ , then  $\mathbf{A}$  is row equivalent to  $\mathbf{C}$ .

(III) If an augmented matrix is a square matrix, then the linear system it represents can never have a unique solution.

(A) (I) and (III) only.

(B) (II) and (III) only.

(C) (I) and (II) only.

(D) None of the combinations provided is correct.

**Answer:** (C)

5. How many of the statements below is/are correct?

(I) The solution set of the linear equation  $ax + by + cz = d$  ( $a, b, c$  are not all zero) cannot be empty.

(II) The solution set of a linear system with two equations in the variables  $x, y, z$  cannot be empty.

(III) The solution set of a linear system with two equations in the variables  $x, y$  cannot contain exactly 2 solutions.

(A) None.

(B) Exactly one.

(C) Exactly two.

(D) All three.

**Answer:** (C)