Matrix assignment

July 29, 2023

Questions

1. The pair of linear equations $2x = 5y + 6$ and $15y = 6x - 18$represents two lines which are :
   (a) intersecting
   (b) parallel
   (c) coincident
   (d) either intersecting or parallel
2. Two schools P and Q decided to award prizes to their students for two games of Hockey ₹x per students and cricket ₹y per student. School P decided to award a total of ₹$9,500$ for the two games to 5 and 4 students respectively; while school Q decided to award ₹$7,370$ for the two games to 4 and 3 students respectively.

Based on the given information, answer the following questions :

(i) Represent the following information algebraically(in terms of x and y).

(ii) (a) what is the prize amount for hockey ?

(b) Prize amount on which game is more and by how much ?

(iii) what will be the total prize amount if there are 2 students each from two games ?

3. If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represents coincident lines,then the values of r is :

   (a) $-\frac{1}{2}$

   (b) $\frac{1}{2}$

   (c) 2

   (d) -2

4. The pair of equations x=a and y=b graphically represents lines which are :

   (a) parallel

   (b) intersecting at (b,a)

   (c) coincident

   (d) intersecting at (a,b)

5. (a) If the system of linear equations $2x+3y = 7$ and $2ax+(a+b)y = 28$ have infinite number of solutions, then find the values of a and b.

   (b) If $217x + 131y = 913$ and $131x + 217y = 827$, then solve the equations for the values of x and y.

6. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 3.Find the numbers.

7. If (a ,b),(c, d) and (e, f) are the vertices of $\triangle ABC$ and Δ denotes the area of $\triangle ABC$, then

$$\begin{vmatrix} a & c & e \\ b & d & f \\ 1 & 1 & 1 \end{vmatrix}^2 \tag{1}$$

   is equal to

   (a) $2\Delta^2$

   (b) $4\Delta^2$

   (c) 2Δ

   (d) 2Δ

8. If $\begin{bmatrix} 2 & 0 \\ 5 & 4 \end{bmatrix} = P + Q$ is a symmetric and Q is a skew symmetric matrix, then Q is equal to

   (a) $\begin{bmatrix} 2 & \frac{5}{2} \\ \frac{5}{2} & 4 \end{bmatrix}$

   (b) $\begin{bmatrix} 0 & -\frac{5}{2} \\ \frac{5}{2} & 0 \end{bmatrix}$

   (c) $\begin{bmatrix} 0 & \frac{5}{2} \\ -\frac{5}{2} & 0 \end{bmatrix}$

   (d) $\begin{bmatrix} 2 & -\frac{5}{2} \\ \frac{5}{2} & 4 \end{bmatrix}$

9. If $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 3 & a & 1 \end{bmatrix}$ is non-singular matrix and $a \in A$, then the set A is

   (a) $\mathbb{R}$

   (b) $\{0\}$

   (c) $\{4\}$

   (d) $\mathbb{R}$-$\{4\}$

10. If $|A| = |kA|$, where A is a square matrix of order 2,then sum of all possible values of k is

   (a) 1

   (b) -1

   (c) 2

   (d) 0

11. (a) If $A = \begin{bmatrix} -3 & -2 & -4 \\ 2 & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$,then find AB and use it to solve the following system of equations :

$$x - 2y = 3 \qquad (2)$$

$$2x - y - z = 2 \qquad (3)$$

$$-2y + z = 3 \qquad (4)$$

(b) If $f(\alpha)=\begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$,then prove that $f(\alpha).f(-\beta) = f(\alpha-\beta)$.