Linear Equations in Two Variables

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10th Maths - Chapter 3

This is Problem-4.3 from Exercise 3.2

1. Which of the following pairs of linear equations are Consistent/Inconsistent?If,consistent find the solutions graphically :
   Solution:
   Equations can be written as:

$$\begin{pmatrix} 2 & 1 \\ 4 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 4 \end{pmatrix} \tag{1}$$

$$\tag{2}$$

$$x = \frac{\begin{vmatrix} \mathbf{b} & \mathbf{a_2} \end{vmatrix}}{\begin{vmatrix} \mathbf{a_1} & \mathbf{a_2} \end{vmatrix}} = \frac{\begin{vmatrix} 6 & 1 \\ 4 & -2 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ 4 & -2 \end{vmatrix}} = \frac{(6)(-2)-(4)(1)}{(2)(-2)-(1)(4)} = \frac{-12-4}{-4-4} = 2 \tag{3}$$

$$y = \frac{\begin{vmatrix} \mathbf{a_1} & \mathbf{b} \end{vmatrix}}{\begin{vmatrix} \mathbf{a_1} & \mathbf{a_2} \end{vmatrix}} = \frac{\begin{vmatrix} 2 & 6 \\ 4 & 4 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ 4 & -2 \end{vmatrix}} = \frac{(2)(4)-(6)(4)}{(2)(-2)-(1)(4)} = \frac{8-24}{-4-4} = \frac{-16}{-8} = 2$$

$$\tag{4}$$

$$\tag{5}$$

Therefore,it is a Consistent Equation.

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