Pair of Linear Equations in Two Variables

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August 10, 2023

Class 10^{th} Maths - Chapter 3

This is Problem-1.1 from Exercise 3.2

1. 10 students of Class X took part in a mathematics quiz.If the number of girls is 4 more than the number of boys,find the number of boys and girls who took part in the quiz.

   Solution:
   Let number of boys be y and number of girls be x.

$$x + y = 10 \tag{1}$$
$$y + 4 = x \tag{2}$$

   The 1^{st} equation is $x - y$=4
   The 2^{nd} equation is $y + x$=10

$$\begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 10 \end{pmatrix} \tag{3}$$

$$y = \begin{vmatrix} \mathbf{a_1} & \mathbf{b} \\ \mathbf{a_1} & \mathbf{a_2} \end{vmatrix} = \frac{\begin{vmatrix} 1 & 4 \\ 1 & 10 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix}} = \frac{10-4}{1-(-1)} = \frac{6}{2} = 3 \tag{4}$$

$$\tag{5}$$

$$x = \begin{vmatrix} \mathbf{b} & \mathbf{a_2} \\ \mathbf{a_1} & \mathbf{a_2} \end{vmatrix} = \frac{\begin{vmatrix} 4 & -1 \\ 10 & 1 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix}} = \frac{4-(-10)}{1-(-1)} = \frac{14}{2} = 7 \tag{6}$$

$$\tag{7}$$
$$\tag{8}$$

   Therefore y=3 and x=7