Linear equations in two variables

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10^{th} Maths - Chapter 3

This is Problem-3.5 from Exercise 3.2

1. On comparing the ratios $\frac{a_1}{a_2}$,$\frac{b_1}{b_2}$and$\frac{c_1}{c_2}$,find out whether the following pairs of linear equations are consistent,or inconsistent

$$\frac{4}{3}x + 2y = 8 \tag{1}$$
$$2x + 3y = 12 \tag{2}$$

Solution:

Matrix form of the equations: $\begin{pmatrix} \frac{4}{3} & 2 & 8 \\ 2 & 3 & 12 \end{pmatrix}$

$R_1 = \begin{pmatrix} \frac{4}{3} & 2 & 8 \end{pmatrix}, R_2 = \begin{pmatrix} 2 & 3 & 12 \end{pmatrix}$

$R_1 \to 3R_1$,we get:

$$\begin{pmatrix} 4 & 6 & 24 \\ 2 & 3 & 12 \end{pmatrix} \tag{3}$$

$R_1 \to \frac{R_1}{2}$,we get:

$$\begin{pmatrix} 2 & 3 & 12 \\ 2 & 3 & 12 \end{pmatrix} \tag{4}$$

$R_2 \to R_2 - R_1$

$$\begin{pmatrix} 2 & 3 & 12 \\ 0 & 0 & 0 \end{pmatrix} \tag{5}$$

As R_2 is equal to$\begin{pmatrix} 0 & 0 & 0 \end{pmatrix}$,Therefore the two equations have infinitely many solutions