5.2.68

AI25BTECH11001 - ABHISEK MOHAPATRA

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Question: Solve $2x + 3y = 11$ and $2x + 4y = -24$ and hence find the value of m fror which $y = mx + 3$.
Solution: Given:

$$2x + 3y = 11 \tag{0.1}$$

And,

$$2x + 4y = -24 \tag{0.2}$$

So,

$$\begin{pmatrix} 2 & 3 \\ 2 & 4 \end{pmatrix} \mathbf{X} = \begin{pmatrix} 11 \\ -24 \end{pmatrix} \tag{0.3}$$

Augumented Matrix:

$$\left(\begin{array}{cc|c} 2 & 3 & 11 \\ 2 & 4 & -24 \end{array}\right) \tag{0.4}$$

$$\xrightarrow{R_2 \to R_2 - R_1} \left(\begin{array}{cc|c} 2 & 3 & 11 \\ 0 & 1 & -35 \end{array}\right) \tag{0.5}$$

$$\xrightarrow{R_1 \to R_1 - 3R_2} \left(\begin{array}{cc|c} 2 & 0 & 116 \\ 0 & 1 & -35 \end{array}\right) \tag{0.6}$$

$$\Rightarrow \left(\begin{array}{cc|c} 1 & 0 & 58 \\ 0 & 1 & -35 \end{array}\right) \tag{0.7}$$

So,

$$\mathbf{X} = \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 58 \\ -35 \end{pmatrix} \tag{0.8}$$

Given,

$$y = mx + 3 \tag{0.9}$$

$$\Rightarrow m = \frac{y-3}{x} = -\frac{19}{29} \tag{0.10}$$

So, $m = -\frac{19}{29}$
Graph: