

Q8. Find the equation of the line passing through the point of intersection of $lx + y = 5$ and $x + 3y + 8 = 0$ and parallel to the line $3x + 4y = 1$.

Sol. Given lines are:

$$2x + y = 5 \quad \text{(i)}$$

$$x + 3y = -8 \quad \text{(ii)}$$

Solving (i) and (ii), we get their point of intersection as $\left(\frac{23}{5}, \frac{-21}{5}\right)$.

Slope of line $3x + 4y = 7$ is $\frac{-3}{4}$. So, the line parallel to this line has slope

$$\frac{-3}{4}.$$

Then the equation of the line passing through the point $\left(\frac{23}{5}, \frac{-21}{5}\right)$ having

slope $\frac{-3}{4}$ is:

$$y + \frac{21}{5} = \frac{-3}{4} \left(x - \frac{23}{5} \right)$$

$$\Rightarrow 4y + \frac{84}{5} = -3x + \frac{69}{5} \Rightarrow 3x + 4y = \frac{84 - 69}{5} = 3$$

$$\Rightarrow 3x + 4y + 3 = 0$$