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MAT 104

1. $y - 3x - 2 = 0$ ... eqn (i)

making y the subject of

$y = 3x + 2$

$y = mx + c$

$m_1 = 3$

eqn

$3y + x + 9 = 0$

$\frac{3y}{3} = \frac{-x}{3} - \frac{9}{3}$

$y = \frac{-x}{3} - 3$

$m_2 = -\frac{1}{3}$

$m_1 m_2 = -1$

$3x \cdot \frac{1}{3} = -1$

∴ The lines are perpendicular to each other

2 $3y - 4 = 2x + 3$ and $y - 5 = x + 6$

$3y - 4 = 2x + 3$ - eqn (i)

making y the subject of formula

$3y = 2x + 3 + 4$

$\frac{3y}{3} = \frac{2x}{3} + \frac{7}{3}$

$y = \frac{2x}{3} + \frac{7}{3}$

$m_1 = 2/3$

$y - 5 = x + 6$ - eqn (ii)

making y subject of formulae

$y = x + 6 + 5$

$y = x + 11$

$m_2 = 1$

For the two lines to be perpendicular M_1

$\frac{2}{3} \times 1 = \frac{2}{3}$

3 $x^2 + y^2 + 3xy - 11 = 0$

$2x + \frac{2y\,dy}{dx} + 3\left[y + \frac{x\,dy}{dx}\right] = 0$

$2x + \frac{2y\,dy}{dx} + 3y + \frac{3x\,dy}{dx} = 0$

$\frac{dy}{dx}\left[2y + 3x\right] = -\frac{2x - 3y}{2y + 3x}$

$\frac{dy}{dx} = -\frac{2x - 3y}{2y + 3x}$

$\frac{dy}{dx} = -\frac{-2x - 3y}{2y + 3x}$

$\frac{dy}{dx}\Big|_{\substack{x \to 1 \\ y \to 2}} = \frac{-2(1) - 3(2)}{2(2) + 3(1)}$

$\frac{dy}{dx} = \frac{-2 - 6}{4 + 3} = \frac{-8}{7}$

$m = -8/7$

$y - y_1 = m[x - x_1]$

$y - 2 = -\frac{8}{7}[x - 1]$

$7y - 14 = -8x + 8$

$7y + 8x - 22 = 0$ which gives eq