IFEANYI - OBI ADAEZE CLARE

19/MH30/193

MBBS

ASSIGNMENT

1) $y - 3x - 2 = 0 \quad \cdots (1)$

$3y + x + 9 = 0 \quad \cdots (2)$

For the equations to be perpendicular ; $m_1 m_2 = -1$

$y - 3x - 2 = 0$

$y = 3x + 2$

comparing with $y = mx + c$

$m_1 = 3$

$3y + x + 9 = 0$

$3y = -x - 9$

$y = -\frac{1}{3}x - 3$, comparing

$y = mx + c$

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

Recall: to prove perpendicularity, $m_1 m_2 = -1$

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

since $m_1 m_2 = -1$

$\therefore$ The lines $y - 3x - 2 = 0$ and $3y + x + 9 = 0$ are perpendicular.

2) $3y - 4 = 2x + 3 \quad \cdots (1)$

$y - 5 = x + 6 \quad \cdots (2)$

$3y - 4 = 2x + 3$

$3y = 2x + 7$

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

comparing to $y = mx + c$

$\therefore m_1 = \frac{2}{3}$

$y - 5 = x + 6$

$y = x + 11$

comparing with $y = mx + c$

$\therefore m_2 = 1$

$\therefore$ Recall : $m_1 m_2 = -1$ to prove perpendicularity

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

$\therefore$ Therefore, the lines $3y - 4 = 2x + 3$ and $y - 5 = x + 6$ are not perpendicular.

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

$(x = 1, y = 2)$

$m = \frac{dy}{dx}$

$2x + 2y\frac{dy}{dx} + 3\left(x \cdot \frac{dy}{dx} + y\right) = 0$

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

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

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

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

$$m = \left.\frac{dy}{dx}\right|_{x=1,\, y=2} = \frac{-2(1) - 3(2)}{2(2) + 3(1)} = \frac{-2-6}{4+3}$$

$$= \frac{-8}{7}$$

a) Equation of tangent

Recall: $y - y_1 = m(x - x_1)$

$$y - 2 = \frac{-8}{7}(x - 1)$$

$$y - 2 = -\frac{8}{7}x + \frac{8}{7}$$

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

$7y + 8x - 22 = 0$ ... the equation of the tangent

b) Equation of the normal

Recall: $y - y_1 = -\frac{1}{m}(x - x_1)$

$$-\frac{1}{m} = \frac{-1}{\frac{-8}{7}} = \frac{7}{8}$$

$$y - 2 = \frac{7}{8}(x - 1)$$

$$8y - 16 = 7x - 7$$

$8y - 7x - 9 = 0$ ∴ the equation of the normal

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