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19/MHS01/001.
MBBS
MAT 104.

1) $y - 3x - 2 = 0$ and $3y + x + 9 = 0$

Let $P = y - 3x - 2 = 0$

$\frac{dy}{dx} - 3 = 0$

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$\frac{dy}{dx} = 3$

Let $k = 3y + x + 9 = 0$

$3\frac{dy}{dx} + 1 + 0 = 0$

$3\frac{dy}{dx} + 1 = 0$

$\frac{dy}{dx} = -\frac{1}{3}$

$\therefore A \perp B$

i.e, $y - 3x - 2 = 0$ is perpendicular to $3y + x + 9 = 0$

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

Let $A = 3y - 4 = 2x + 3$

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

$3\frac{dy}{dx} = 2$

$\frac{dy}{dx} = \frac{2}{3}$

Let $B = y - 5 = x + 6$

$\frac{dy}{dx} - 0 = 1 + 0$

$\frac{dy}{dx} = 1$

$\therefore A \not\perp G$

i.e $3y - 4 = 2x + 3$ is not perpendicular to $y - 5 = x + 6$.

3. $x^2 + y^2 + 3xy - 11 = 0$ at point $(1, 2)$.

$2x + 2y\frac{dy}{dx} + 3\left(x \times \frac{dy}{dx} + y \times 1\right) - 0 = 0$

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

$$2y\,dy/dx + 3x\,dy/dx = -2x - 3y$$

$$dy/dx\,(2y + 3x) = -2x - 3y$$

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

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

when $x = 1$ and $y = 2$

$$M = -\frac{[2(1) + 3(2)]}{2[2] + 3(1)}$$

$$M = -\frac{[2 + 6]}{4 + 3}$$

$$\therefore M = -8/7$$

a) Equation of the tangent to a curve

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

$$y - 2 = -8/7\,(x - 1)$$

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

$$7y + 8x - 14 - 8 = 0$$

$$7y + 8x - 22 = 0.$$

~~$8x + 7y - 2$~~

b) Equation of the normal to a curve

$$y - y_1 = -1/m\,(x - x_1)$$

$$y - 2 = 7/8\,(x - 1)$$

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

$$8y - 7x - 16 + 7 = 0$$

~~$7x - 8y + 9 = 0$~~

$$8y - 7x - 9 = 0$$