

**MUSINGS ON CULTURE,
HISTORY AND THE
NIGERIAN PEOPLES**

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Course: Maths 102

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

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

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

Let $B = 3y - x + 9 = 0$

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

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

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

$$A \cdot B = -1$$

$\therefore y - 3x - 2 = 0$ is perpendicular to $3y - x + 9 = 0$

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

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

$$A = 3y - 4 - 2x - 3 = 0$$

$$A = 3y - 2x - 7 = 0$$

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

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

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

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

$$B = y - 5 - x - 6 = 0$$

$$B = y - x - 11 = 0$$

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

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

$$AB \neq -1$$

$\therefore 3y - 4 = 2x + 3$ is not perpendicular to $y - 5 = x + 6$

$$3. \quad x^2y^2 + 3y - 11 = 0 \text{ at point } (1, 2)$$

Solution

$$2x + 2y \frac{dy}{dx} + 3(x^2 \frac{dy}{dx} + (2xy)) = 0$$

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

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

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

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

When $x=1$ and $y=2$

$$m = \frac{2(1)+3(2)}{-2(2)-3(1)}$$

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

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

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

Equation of the tangent to a curve

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

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

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

$$7(y - 2) = -8x + 8$$

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

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

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

Equation of the normal to a curve

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

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

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

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

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

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

$$8y = 7x - 7 + 16 \quad 7x - 8y + 9 = 0$$