

Atanarke Asha Alava
17/11/2017
MBBS MHS
Maths 101

Assignment

1

$$j = 3x - 2 = 0 \quad \& \quad 3y + 2 + 9 = 0$$

Let $j - 3x - 2 = 0$ be M_1
and $3y + 2 + 9 = 0$ be M_2
 \therefore for M_1

$$j - 3x - 2 = 0 \Rightarrow j = 3x + 2$$
$$\frac{dj}{dx} = 3 + 0$$
$$\frac{dj}{dx} = \underline{\underline{3}}$$

\therefore for M_2

$$3y + 2 + 9 = 0 \Rightarrow 3y = -2 - 9$$
$$3 \frac{dy}{dx} = -1 - 0$$
$$\frac{dy}{dx} = \underline{\underline{-\frac{1}{3}}}$$

$$\therefore M_1 = 3 \quad \text{and} \quad M_2 = -\frac{1}{3}$$

$$\Rightarrow M_1 M_2 = -1$$

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

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

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

Let $3y - 2x - 7 = 0$ be M_1

Let $j - 2x - 11 = 0$ be M_2

for M_1

$$3y - 2x - 7 = 0 \Rightarrow 3y = 2x + 7$$

$$5 \frac{dx}{dy} = 2$$

$$\frac{dx}{dy} = \frac{2}{5}$$

for M_2

$$y - x - 11 = 0 \Rightarrow y = x + 11$$

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

$$\therefore M_1 = \frac{2}{5} \text{ and } M_2 = 1$$

$$\Rightarrow M_1 \cdot M_2 = -1$$

$$\frac{2}{5} \cdot 1 = \frac{2}{5}$$

$$\therefore M_1 \cdot M_2 \neq -1$$

$3y - 1 = 2x + 5$ and $y - 5 = x + 6$ are not perpendicular

$$\text{iv } x^2 + y^2 + 3xy - 11 = 0 \text{ at point } x=1 \text{ and } y=2$$

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

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

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

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

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

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

$$m = \frac{dy}{dx} \Big|_{x=1 \text{ and } y=2} = \frac{-3(2) - 2(1)}{2(2) + 3(1)} = \frac{-6 - 2}{4 + 3} = \frac{-8}{7}$$

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

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

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

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

$$\underline{8x + 7y - 22 = 0}$$

Equation of normal: $M_1 M_2 = -1$

$$m_2 = -1/m_1 = -1/8/4 = 7/8$$

$$y - y_1 = m_2(x - x_1)$$

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

$$8(y - 2) = 7(x - 1)$$

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

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

$$\underline{7x - 8y + 9 = 0}$$