ARUBALUEZE GOODNESS EBELE
19/MHS01/101
MATHS ASSIGNMENT

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

$y - 3x - 2 = 0$

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

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

$3y + x + 9 = 0$

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

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

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

$m_2 = -1/3$

$m_1 m_2 = -1$

$3x - 1/3 = -1$

These lines are perpendicular

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

$3y - 2x - 7 = 0$

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

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

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

$y - x - 5 - 6 = 0$

$y - x - 11 = 0$

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

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

$m_1 m_2 = -1$

These pair of lines are not perpendicular to each other

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

Using implicit differentiation

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

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

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

Subsitute the values for x & y

$$\frac{dy}{dx} = -2($$

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

$$\frac{dy}{dx} = \frac{-(2+6)}{4+3}$$

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

$$m_1 = -\frac{8}{7}$$

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

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

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

$7y + 8x - 22 = 0$ (equ of the tangent

$$m_2 = \frac{-1}{-8/7}$$

$$m_2 = -1 \times -\frac{7}{8}$$

$$m_2 = \frac{7}{8}$$

$(x - x_1) = (y - y_1)$ 2

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

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

$7x - 8y - 7 + 2 = 0$

$7x - 8y - 5 = 0$ (equation of the normal).

$y - y_1 = m_2(x_2 - x_1)$

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

Cross multiply

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

$8y - 16 = 7x - 7$

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

$8y - 7x = 9$

$8y - 7x - 9 = 0$

∴ The equation of the nomal is $8y - 7x - 9 = 0$