

Name: OGBIWA GLORY UYIOGHESA

College: MHS Department MB33

Mathe Number: 19/MHS01/090.

Course Code: MAT 104.

Maths Assignment Answer

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

Solution

~~$y - 3x - 2 = 0$~~ if $m_1, m_2 = -1$, the lines are perpendicular.

$y - 3x - 2 = 0$.

make y subject of formula.

$y = 3x + 2$

$y = m_1x + c$

$m_1 = 3$

$3y + 2x + 9 = 0$.

make y subject of formula.

$3y = -2x - 9$

$y = \frac{-2x - 9}{3}$

~~$y = \frac{-2x - 9}{3}$~~

$y = m_2x + c$

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

Recall $m_1 m_2 = -1$

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

\therefore the lines are perpendicular to each other

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

Solution

$3y - 4 = 2x + 3$

$3y = 2x + 3 + 4$

$3y = 2x + 7$

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

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

$y = m_1x + c$

$y - 5 = x + 6$

$y = x + 6 + 5$

$y = x + 11$

$y = m_2x + c$

$m_2 = 1$

Recall $m_1 m_2 = -1$

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

\therefore the lines are not perpendicular to each other.

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

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

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

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

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

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

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

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

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

Equation of tangent =

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

$$y - 2 = m(x - 1)$$

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

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

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

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

Equation of normal

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

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

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

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

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