

Jatto Fadeelah Onize 19/MHS01/216

Name: Jatto Fideelah Onize

Matric No: 19/MH501216

College/Dept: MHS/MBBS

Course Code: MAT 104

Assignment

Examine whether or not these pair of lines are perpendicular to each other.

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

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

$$y = mx + c$$

$$y = 3x + 2$$

$$m_1 = 3$$

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

$$y = mx + c$$

$$3y = -x - 9$$

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

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

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

∴ These pair of lines will be perpendicular if

$$m_1 \times m_2 = -1$$

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

∴  $m_1 \perp m_2$  The lines are perpendicular to each other.

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

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

$$y = mx + c$$

$$3y = 2x + 3 + 4$$

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

$$y = \frac{2x}{7} + 1$$

$$m_1 = \frac{2}{7}$$

$$y - 5 = x + 6 \quad - \text{ii}$$

$$y = mx + c$$

$$y = x + 6 + 5$$

$$y = x + 11$$

$$m_2 = 1$$

For  $m_1$  eq i and eq ii to be perpendicular  $m_1 \times m_2 = -1$

$$m_1 \times m_2 = \frac{2}{7} \times 1 = \frac{2}{7}$$

~~eq i and eq ii are~~

The lines are not perpendicular to each other.

3. Find the equations of the tangent and normal to the curve  $x^2 + y^2 + 3xy - 11 = 0$  at point (1, 2)

Soln:

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

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

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

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

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

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

$$\frac{dy}{dx} = \frac{-3(2)-2(1)}{2(2)+3(1)} = \frac{-6-2}{4+3} = \frac{-8}{7}$$

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

Equation of a tangent

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

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

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

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

Equation of a normal

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

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

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

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

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

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

