

Name: Afejgunji Ayomide Mercy

Matric no: 11111101026

Course: MBBS

Mathematics Assignment

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

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

$$y = 3x + 2$$

$$\therefore m = 3$$

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

$$3y = -x - 9$$

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

$$m = -1/3$$

$$m_1 \times m_2 = 3 \times \frac{-1}{3} = -1$$

Since $m_1 m_2 = -1$, the two pairs are perpendicular

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

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

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

$$3y = 2x + 7$$

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

$$m = 2/3$$

$$y - 5 = x + 6$$

$$y = x + 6 + 5$$

$$y = x + 11$$

$$m = 1$$

$$m_1 \times m_2 = \frac{2}{3} \times 1 = 2/3$$

Since $m_1 m_2 \neq -1$, the two pairs are not perpendicular.

3) Find the equation of the tangent and normal of the curve

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

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

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

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

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

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

$$m = \frac{dy}{dx} \Big|_{x=1, y=2}$$

$$m = \frac{-2(1) - 3(2)}{2(2) + 3(1)} = \frac{-8}{7} = -\frac{8}{7}$$

tangent: $y_2 - y_1 = m(x - x_1)$

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

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

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

gradient is $-\frac{8}{7}$

$$8x + 7y - 22 = 0 \text{ is the}$$

equation of the tangent to the curve

normal: $y_2 - y_1 = \frac{-1}{m}(x - x_1)$

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

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

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

$8y - 7x - 9 = 0$ is the equation of the normal.