Name: ADEJUWON PEACE ADEMIYO
Matric No: 19/MHS01/027.
Department: MBBS.

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

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

Sol

For them to be perpendicular to each other $M_1 M_2 = -1$

$y - 3x - 2 = 0$ --eqn (i)

Making y the subject

$y = 3x + 2$

$y = mx + c$

$M_1 = 3$.

eqn (ii)

$3y + x + 9 = 0$

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

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

$M_2 = -1/3$

$M_1 M_2 = -1$

$3 \times -1/3 = -1$

∴ The lines are perpendicular to each other.

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

$3y - 4 = 2x + 3$ - eqn ①

making y subject of the formula.

$3y = 2x + 3 + 4$

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

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

$M_1 = 2/3$.

$y - 5 = x + 6$ — eqn ②

Making y subject of formula

$y = x + 6 + 5$.

$y = x + 11$

$M_2 = 1$

For the two lines to be perpendicular $M_1 M_2 = -1$

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

$\frac{2}{3} \times 1 \neq -1$

∴ 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 the point $x=1, y=2$.

Sol

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

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

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

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

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

$$\left.\frac{dy}{dx}\right|_{\substack{x\to 1\\ y\to 2}}=\frac{-2(1)-3(2)}{2(2)+3(1)}$$

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

$$M=-8/7$$

$$y-y_1=m\{x-x_1\}$$

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

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

$7y+8x-22=0$ which gives the eq of the tangent

For eq of Normal.

$M_1 M_2 = -1$

$\frac{-8}{7} \cdot M_2 = -1$

$M_2 = -1 / -8/7$

$M_2 = +1 \times \frac{7}{+8}$

$M_2 = 7/8.$

$y - y_1 = M_2 \{x - x_1\}$

$y - 2 = 7/8 \{x - 1\}$

$8y - 16 = 7x - 7$

$8y - 7x - 9 = 0$ which gives the eq of the Normal