AKINLADE OLUWANIYI ELISHA 19/MHS01/072 MBBS

1. $y-3x-2=0$ — ①

$3y+x+9=0$ — ②

For two lines $y_1 = m_1x + c_1$ and $y = mx+c$, if they are perpendicular, $mm_1 = -1$

$y = 3x+2$ $[m=3]$

$y = \frac{-x}{3} - \frac{9}{3} = \frac{-x}{3} - 3$ $\left[m_1 = \frac{-1}{3}\right]$

$mm_1 = 3 \cdot \frac{-1}{3} = -1$

∴ The lines are perpendicular

2. $3y-4 = 2x+3$ — ① For (1), $3y = 2x+7$

$y-5 = x+6$ — ② $y = \frac{2}{3}x + \frac{7}{3}$ $[m_1 = 2/3]$

For (2):

$y = x+11$ $[m=1]$ $m \cdot m_1 = 1 \cdot \frac{2}{3} = \frac{2}{3} \neq -1$

∴ The lines are not perpendicular

3. $x^2+y^2+3xy-11=0$ at (1,2). find the equ of the tangent and normal

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

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

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

$$\left.\frac{dy}{dx}\right|_{(1,2)} = \frac{2(1)+3(2)}{-2(2)-3(1)} = \frac{8}{-7} = -\frac{8}{7}$$

For tangent:

$y-y_1 = m(x-x_1)$; $y-2 = -\frac{8}{7}(x-1)$ ∴ $7y+8x = 22$ [equ of tangent]

For normal:

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

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

$$8y = 7x + 9$$ [equ of normal]