8th April, 2020

CHUKWUEMEKA EVANGEL NWACHINYEREUGO
MEDICINE AND SURGERY
19/MHS01/130
100 LEVEL

1. $y-3x-2=0 \quad \ldots (i)$
$3y+x+9=0 \quad \ldots (ii)$
for these lines to be perpendicular
$m_1 m_2 = -1$
for (i) $y = 3x+2$
Comparing with $y = mx+c$
$m_1 = 3$
for (ii) $y = \frac{-1}{3}x - 3$
Comparing with $y = mx+c$
$m_2 = -1/3$
Using $m_1 m_2 = -1$ to prove if they are perpendicular: $3 \times \frac{-1}{3} = -1$
∴ the lines are perpendicular to each other side ~~$m_1 m_2 = -1$~~ $m_1 m_2 = -1$

2. $3y-4 = 2x+3 \quad \ldots (i)$
$y-5 = x+6 \quad \ldots (ii)$
making subject formular in (i) and (ii)
$y = \frac{2x}{3} + \frac{7}{3} \quad \ldots (iii) \qquad y = x+11 \quad \ldots (iv)$
Comparing with $y = mx+c$
~~$m_2 = 1$~~ $m_1 m_2 = -1$
$2/3 \times 1 = 2/3$
Since $m_1 m_2 \neq -1$ ∴ the lines are not perpendicular

3 $x^2+y^2+3xy-11=0$ at $(1,2)$

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

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

making dy/dx subject formula

$[2y+3x]\,dy/dx = -2x-3y$

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

$m = dy/dx$ when $x=1$, $y=2$

$= \frac{-2(1)-3(2)}{3(1)+2(2)} = \frac{-2-6}{3+4}$

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

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

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

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

$7y+8x-22=0$

(which gives equation of the tangent)

$y-y_1 = \frac{1}{m_1}(x-x_1)$

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

$8y-16 = 7x-7$

$8y-7x-9=0$

(which gives the equation of the normal)