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ASSIGNMENT ANSWERS

1.) $y - 3x - 2 = 0$ - - ①
$3y + x + 9 = 0$ - - ②
To find if they are perpendicular: $m_1 m_2 = -1$

Make y the subject in equ ①
$y = 3x + 2$
Compare with $y = mx + c$
$\therefore m_1 = 3$

Make y the subject in equ ②
$3y + x + 9 = 0$
$3y = -x - 9$
$y = \frac{-x}{3} - \frac{9}{3}$

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

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

Compare with $y = mx + c$
$\therefore m_2 = \frac{-1}{3}$

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

$= -1$

Since $m_1 m_2 = -1$
$\therefore y - 3x - 2 = 0$ and $3y + x + 9 = 0$ are perpendicular

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

$m=\frac{dy}{dx}$

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

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

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

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

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

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

$m=\left.\frac{dy}{dx}\right|_{x=1,y=2}=\frac{-2(1)-3(2)}{2(2)+3(1)}=\frac{-2-6}{4+3}=\frac{-8}{7}$

Eqn of tangent :-

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

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

$7(y-2)=-8(x-1)$

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

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

$7y+8x-22=0$ {eqn of tangent}

Eqn of normal :-

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

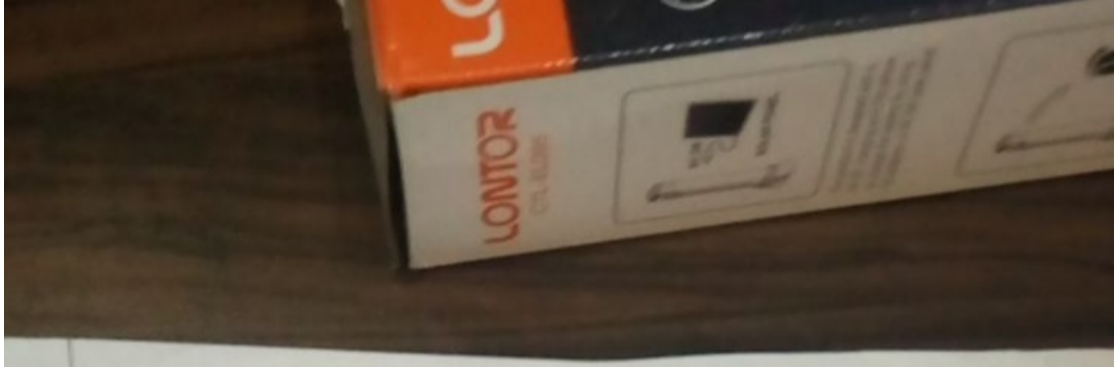
$y-2=-\frac{1}{-8/7}(x-1)$

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

$8y-16=7x-7$

$8y-7x-16+7=0$

$8y-7x-9=0$ {eqn of normal}



2.) $3y-4 = 2x+3$ ---①
$y-5 = x+6$ ---②

Make y the subject in eqn ①

$3y = 2x+3+4$

$y = \frac{2x+3+4}{3}$

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

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

Compare with $y = mx+c$

$\therefore m_1 = \frac{2}{3}$

Make y the subject in eqn ②

$y-5 = x+6$

$y = x+6+5$

$y = x+11$

By comparing with $y = mx+c$

$m_2 = 1$

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

$\therefore 3y-4 = 2x+3$ and $y-5 = x+6$ are not perpendicular because $m_1 m_2 \neq -1$