Q3) $x^2+y^2+3xy-11=0$

$\frac{dy}{dx}$

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

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

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

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

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

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

Equ of a tangent

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

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

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

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

$7y+8x-22=0$ equ of tangent.

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

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

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

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

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

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

$y = mx + c$

$m = -\frac{1}{3}$

$m_1 m_2 = -1$ (perpendicular)

$\therefore \cancel{3} \times -\frac{1}{\cancel{3}} = -1$

$\therefore$ since $m_1 m_2 = -1$, therefore they are perpendicular.

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

~~B~~ making y subject of formula

$3y = \cancel{2x+3+4}\ 2x + 7$

$y = \frac{2x}{3} + \cancel{\frac{3+4}{3}}\ \frac{7}{3}$

$y = mx + c$

$m = \frac{2}{3}$

$y - 5 = x + 6$

$y = x + 6 + 5$

$y = x + 11$

$y = mx + c$

$y = 1$

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

$\therefore m_1 m_2 \neq -1$

Hence the lines are NOT PERPENDICULAR

7/04/2020 MATH 104

OLATOMIWA PRECIOUS OLANIKE

19/MHS01/332

MBBS

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

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

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

3) find the equation of the tangent and normal to the curve $x^2+y^2+3xy-11=0$ at the point $x=1, y=$

Solution

1) ~~$y+y-3x+$~~ $y-3x-2=0$

making y subject of formula

$y=3x+2$

By comparison $y=mx+c$

$m=3$

$3y+x+9=0$

making y subject of the formula

$3y=x+9$

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

$y=\frac{-1x}{3} \pm 3$