Maths Assignment

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

Solution

$y-3x-2=0 \quad \cdots (1)$

$y=3x+2$

$\because y=mx+c$

$\therefore m_1=3$

$3y+x+9=0 \quad \cdots (2)$

$3y=-x-9$

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

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

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

~~y=~~ $y=mx+c$

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

$\therefore m_1 m_2=-1$ [Prove it is perpendicular]

$3 \times -\frac{1}{3}=-1$ [It is perpendicular]

2) $3y-4=2x+3 \quad \cdots (1)$

$3y=2x+3+4$

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

$\therefore y=\frac{2}{3}x+\frac{7}{3} \quad \because y=mx+c$

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

~~3~~$y-5=x+6$

$y=x+6+5$

$y=x+11 \quad \because y=mx+c$

$m_2=1$

$\therefore m_1 m_2 = -1 \; ; \; \frac{2}{3} \times 1=\frac{2}{3}$ [It is not perpendicular]

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

$dy/dx = 2x + 2y\,dy/dx + 3\{x\,dy/dx + y\} - 0 = 0$

$dy/dx = 2x + 2y\,dy/dx + 3x\,dy/dx + 3y = 0$

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

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

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

at the point $x=1, y=2$

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

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

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

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

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

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

$7y + 8x - 22 = 0 \Rightarrow$ Equation of tangent

b) $m = \frac{-1}{-8/7}$

$m = 7/8$

$y - y_1 = 7/8(x - x_1)$

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

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

$8y - 16 = 7x - 7$

$8y - 7x - 9 = 0 \Rightarrow$ Equation of normal