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Assignment

1.) $y-3x-2=0$

$3y+x+9=0$

For the lines to be perpendicular $M_1M_2=-1$

$y-3x-2=0$

make y the subject of the formula

$y=3x+2$

From the equation $y=mx+c$

~~$m=3$~~ $m_1=3$

$3y+x+9=0$

make y the subject of the formula

$3y=-x-9$

$y=\frac{-x}{3}-\frac{9}{3}$ (divide both sides by 3)

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

From $y=mx+c$

$m_2=-\frac{1}{3}$

$m_1m_2=3\times-\frac{1}{3}=-1 \therefore y-3x-2=0$ and $3y+x+9=0$ are Perpendicular

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

$y - 5 = x + 6$

For the lines to be perpendicular $m_1 m_2 = -1$

$3y - 4 = 2x + 3$

make y the subject of formula

$3y = 2x + 3 + 4$

$\frac{3y}{3} = \frac{2x}{3} + \frac{7}{3}$ (divide both sides by 3

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

$m_1 = \frac{2}{3}$; from $y = mx + c$

$y - 5 = x + 6$

make y the subject of formula

$y = x + 6 + 5$

$y = x + 11$

$m_2 = 1$; from $y = mx + c$

$m_1 m_2 = 1 \times \frac{2}{3} = \frac{2}{3}$ $\therefore$ $3y = 2x + 7$ and $y = x + 11$ are not perpendicular

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

differentiation of the curve

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

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

$m_1 = \frac{dy}{dx} = \frac{-3y - 3x - 2y}{2y + 3x} = \frac{-3(1) - 2(2)}{2(2) + 3(1)} = \frac{-3 - 4}{4 + 3} = \frac{-7}{7} = -1$

equation of tangent:

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

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

$$y-2 = -x+1$$

$$y+x-2-1=0$$

$$y+x-3$$

equation of normal

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

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

$$y-2 = x-1$$

$$y-x-2+1=0$$

$$y-x-1=0$$