$m_2 = \frac{1}{m_1}$

$m_2 = \frac{1}{2}$

$y - y_1 = m_2(x - x')$

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

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

$2y - 4 = x - 1$

$2y - x - 4 + 1 = 0$

$2y - x - 3 = 0$ [Equation of the normal]

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Assignment

Examine whether the following pairs of equations are perpendicular to each other.

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

Solution

$y-3x-2=0$

$y=0+3x+2$

$y=3x+2$.

as since $y=mx+c$

∴ the slope is $3_{//}$

$3y+x+9=0$

$3y=0+x+9$.

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

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

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

as since $y=mx+c$

∴ the slope is $\frac{-1}{3_{N}}$

It means the pair of equations are perpendicular to each other.

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

Solution.

$3y=2x+3+4$

$3y = 2x + 7$

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

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

Since $y = mx + c$ · the slope is $\frac{2}{3}$ //

$y - 5 = x + 6$

$y = x + 6 + 5$

$y = x + 11$ //

Since $y = mx + c$ · the slope is 1 //

It means the pair of equations are not perpendicular to each other.

3. Find the equations of the tangent and normal to the curve $x^2 + y^2 + 3xy - 11 = 0$ at the points $x = 1, y =$

Solution:

$\frac{dy}{dx}\Big|_{x=1} = 1 + y^2 + 3(1)y = 11$

$= 1 + 2y + 3y = 11$

$= 2y + 3y = 11 - 1$

$= 5y = 10$

$= y = \frac{10}{5} = 2$ //

$M = 2$ //

$y - y_1 = M(x - x^1)$

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

$y - 2 = 2x - 2$

$y = 2x - 2 + 2$

$y = 2x$ [Equation of the tangent] //

Equation of the normal: