

7/4/20

MAT 104

Exembatore Gmeka
19/10/201/168
MBS

19/10/201/168

2

① Examine whether or not these pair of lines are perpendicular to each other!

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

② $y - 3x - 2 = 0$, $y = 3x + 2$

Compare with $y = mx + c$

$m_1 = 3$, $c_1 = 2$

②

$3y + x + 9 = 0$

$3y = -x - 9$

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

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

Compare with $y = mx + c$

$m_2 = -\frac{1}{3}$, $c_2 = -3$

If two lines are perpendicular then $m_1 \cdot m_2 = -1$

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

∴ lines $y - 3x - 2 = 0$ and $3y + x + 7 = 0$ are perpendicular to each other.

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

ex) $3y - 4 = 2x + 3$
 $3y = 2x + 7$
 $y = \frac{2}{3}x + \frac{7}{3}$

$\frac{dy}{dx} = \frac{2}{3} = m_1$ ~~at~~

ex) $\rightarrow y - 5 = x + 6$

$y = x + 11$

$\frac{dy}{dx} = 1 = m_2$

When two lines are perpendicular $m_1 \times m_2 = -1$

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

$m_1 \times m_2 \neq -1$

∴ $3y - 4 = 2x + 3$ and $y - 5 = x + 6$ are not perpendicular to each other.

1) 3) Find tangents and normals to $x^2 + y^2 + 2x - 1 = 0$ at point $x = 1, y = 2$

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

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

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

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

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

$$M = \underline{\underline{-\frac{8}{7}}}$$

① Tangent $\Rightarrow y - y_1 = m(x - x_1)$

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

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

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

$$\text{Tangent} \rightarrow \underline{\underline{7y + 8x = 22}}$$

② Normal $\therefore y - y_1 = -\frac{1}{m}(x - x_1)$

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

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

$$8y = 7x + 9$$