

Fazlurrahman Chatterjee Classroom

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Serial No + 044

MAT 104

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

Solution

$y - 3x - 2 = 0$

$y = 3x + 2 = 0$

$\frac{dy}{dx} = m = 3$

$m = 3$

$3y + x + 9 = 0$

$3y = -x - 9$

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

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

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

$\frac{dy}{dx} = m_1 = -\frac{1}{3}$

Product = $3 \times -\frac{1}{3} = -1$

∴ The two lines are perpendicular

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

Solution

$3y - 4 = 2x + 3$

$3y = 2x + 3 + 4$

$3y = 2x + 7$

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

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

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

Product = $\frac{2}{3} \times 1 = \frac{2}{3}$

∴ The two lines are not perpendicular.

3) $x^2 + y^2 + 3$

$m = \frac{dy}{dx}$

$2x + 2y \frac{dy}{dx}$

$2x + 2y \frac{dy}{dx}$

$2x + 2y \frac{dy}{dx}$

$2y \frac{dy}{dx} +$

$\frac{dy}{dx} (2y +$

$\frac{dy}{dx} =$

$m = \frac{dy}{dx} \Big|_x$

Equation

$y - y_1$

$y - 2$

$7(y - 2)$

$7y - 14$

$7y + 8$

$7y +$

$$3) \quad x^2 + y^2 + 3xy - 11 = 0 \quad ; \quad (1, 2)$$

$$m = \frac{dy}{dx}$$

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

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

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

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

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

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

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

Equation of tangent

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

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

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

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

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

$$7y + 8x - 22 = 0$$

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