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Assignment

Matric no: 19/MHS 01/313

Department: MBBS

MAT 102

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

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

$$3y + x + 9 = 0$$

Let A = $y - 3x - 2 = 0$

$$\frac{dy}{dx} - 3 - 0 = 0$$

$$\frac{dy}{dx} - 3 = 0$$

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

Let B = $3y + x + 9 = 0$

$$3\frac{dy}{dx} + 1 + 0 = 0$$

$$3\frac{dy}{dx} + 1 = 0$$

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

A \perp B

$y - 2x - 2 = 0$ is perpendicular to $3y + x + 9 = 0$

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

Let A = $3y - 4 = 2x + 3$

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

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

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

Let B = $y - 5 = x + 6$

$$\frac{dy}{dx} - 0 = 1 + 0$$

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

A $\not\perp$ B

$3y - 4 = 2x + 3$ is not perpendicular to $y - 5 = x + 6$

3 Find the equation of the tangent and normal to the Curve
 $x^2 + y^2 + 3xy - 11 = 0$ at the point $x=1, y=2$

$$x^2 + y^2 + 3xy - 11 = 0 \quad 2x + 2y \frac{dy}{dx} + 3(x \frac{dy}{dx} + yx) = 0 = 0$$

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

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

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

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

when $x=1$ and $y=2$

$$m = \frac{-(2(1) + 3(2))}{2(2) + 3(1)}$$

$$= \frac{-(2+6)}{4+3} = \frac{-8}{7}$$

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

Equation of the tangent of a Curve

$$y - y_1 = m(x - x_1) \quad 7y - 14 = -8x + 8$$

$$y - 2 = -8/7(x - 1) \quad 8x + 7y - 14 - 8 = 0$$

$$y - 2 = -8x/7 + 8/7 \quad 8x + 7y - 22 = 0$$

Equation of the normal to a Curve

$$y - y_1 = -1/m(x - x_1) \quad y - 2 = 7x/8 - 7/8$$

$$y - 2 = 7/8(x - 1) \quad 8y - 16 = 7x - 7$$

$$y - 2 = 7/8(x - 1) \quad 8y - 7x = -7 + 16$$

$$8y - 7x + 9 = 0$$