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Dept: MBBS

College: MHS

Course code: MAT 10A

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Assignment Answer

$$y = 2x^2, \text{ at } (1, 2)$$

Solution

$$\frac{dy}{dx} = 4x$$

$$\frac{dy}{dx} \Big|_{x=1} = 4, \quad m = \frac{dy}{dx} \Big|_{x=1}$$

$$\therefore m = 4$$

$$y - y_1 = m(x - x_1) \quad (\text{Equation of tangent})$$

$$\therefore y - 2 = 4(x - 1)$$

$$y - 2 = 4x - 4$$

$$y - 4x + 2 = 0 \quad (\text{Equation of tangent})$$

$$y - y_1 = -\frac{1}{m}(x - x_1) \quad (\text{Equation of normal})$$

$$\therefore y - 2 = -\frac{1}{4}(x - 1)$$

$$4y - 8 = -x + 1$$

$$4y + x - 9 = 0 \quad (\text{Equation of normal})$$

$$y = 3x^2 - 2x, \text{ at } (2, 8)$$

Solution

$$\frac{dy}{dx} = 6x - 2$$

$$\frac{dy}{dx} \Big|_{x=2} = 10, \quad m = \frac{dy}{dx} \Big|_{x=2}$$

$$4y + x - 9 = 0 \text{ (Equation of normal)}$$

$$y = 3x^2 - 2x, \text{ at } (2, 8)$$

Solution

$$\frac{dy}{dx} = 6x - 2$$

$$\frac{dy}{dx} \Big|_{x=2} = 12 - 2 = 10, \quad m = \frac{dy}{dx} \Big|_{x=2}$$

$$\therefore m = 10$$

$$y - y_1 = m(x - x_1) \text{ (Equation of tangent)}$$

$$\therefore y - 8 = 10(x - 2)$$

$$y - 8 = 10x - 20$$

$$y - 10x + 12 = 0 \text{ (Equation of tangent)}$$

$$\therefore y - y_1 = -\frac{1}{m}(x - x_1) \text{ (Equation of normal)}$$

$$\therefore y - 8 = -\frac{1}{10}(x - 2)$$

$$10y - 80 = -x + 2$$

$$10y + x - 82 = 0 \text{ (Equation of normal)}$$

$(x+1)$
 $(x+1)$

Note: Both maximum and minimum
Jab karna hanti.

T.P

$y = \frac{x^3}{2}$ at $(-1, 6 - \frac{1}{2})$

Solution

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

$$\frac{dy}{dx} / x = -1 = \frac{3(-1)^2}{2}$$

$$\frac{dy}{dx} / x = \frac{3}{2} \quad m = \frac{dy}{dx} / x = \frac{3}{2}$$

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

$y - y_1 = m(x - x_1)$ (Equation of tangent)

$$y - (-\frac{1}{2}) = \frac{3}{2}(x - (-1))$$

$$y + \frac{1}{2} = \frac{3}{2}(x + 1)$$

Multiply through by 2

$$2y + 1 = 3(x + 1)$$

$$2y + 1 = 3x + 3$$

$$2y - 3x - 2 = 0 \text{ (Equation of tangent)}$$

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

$$y - (-\frac{1}{2}) = -\frac{2}{3}(x - (-1))$$

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

Multiply through by 6

$$6y + 3 = -4(x + 1)$$

$$6y + 3 = -4x - 4$$

$$6y + 4x + 7 = 0 \text{ (Equation of normal)}$$

$$y = 1 + 2x - x^2, \text{ at } (-2, -5)$$

Solution

$$\frac{dy}{dx} = -2x + 1$$

$$\frac{dy}{dx} / x \rightarrow -2 = -2(-2) + 1, m = \frac{dy}{dx} / x \rightarrow -2$$

$$\therefore m = 5$$

$$y - y_1 = m(x - x_1) \text{ (Equation of tangent)}$$

$$y - (-5) = 5(x - (-2))$$

$$y + 5 = 5(x + 2)$$

$$y + 5 = 5x + 10$$

$$y - 5x - 5 = 0 \text{ (Equation of tangent)}$$

$$y - y_1 = -\frac{1}{m}(x - x_1) \text{ (Equation of normal)}$$

$$\therefore y - (-5) = -\frac{1}{5}(x - (-2))$$

$$y + 5 = -\frac{1}{5}(x + 2)$$

$$5(y + 5) = -x - 2$$

$$5y + 25 = -x - 2$$

$$5y + x + 27 = 0 \text{ (Equation of normal)}$$

$$\frac{1}{2}x \text{ at } (3, \frac{1}{3})$$

Solution

$$y = x^{-1}$$

$$\therefore \frac{dy}{dx} = -1x^{-2} \text{ or } -x^{-2}$$

$$\frac{dy}{dx} / x = 3 = -3^{-2} = \frac{1}{(-3)^2} = \frac{1}{9}$$

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

$$\therefore m = \frac{1}{9}$$

$$y - y_1 = m(x - x_1) \text{ (Equation of tangent)}$$

$$y - \frac{1}{3} = \frac{1}{9}(x - 3)$$

Multiply through by 9

$$5(y+5) = -x-2$$

$$5y+25 = -x-2$$

$$5y+x+27=0 \text{ (Equation of normal)}$$

$$y = \frac{1}{5}x \text{ at } (3, \frac{1}{5})$$

Solution

$$y = x^{-1}$$

$$\therefore \frac{dy}{dx} = -1x^{-2} \text{ or } -x^{-2}$$

$$\frac{dy}{dx} / x \rightarrow 3 = -3^{-2} = \frac{1}{(-3)^2} = \frac{1}{9}$$

$$m = \frac{dy}{dx} / x \rightarrow 3$$

$$\therefore m = \frac{1}{9}$$

$$y - y_1 = m(x - x_1) \text{ (Equation of tangent)}$$

$$y - \frac{1}{5} = \frac{1}{9}(x - 3)$$

Multiply through by 9

$$9y - 3 = x - 3$$

$$9y - x = 0 \text{ (Equation of tangent)}$$

$$y - y_1 = \frac{1}{m}(x - x_1) \text{ (Equation of normal)}$$

$$y - \frac{1}{5} = 9(x - 3)$$

Multiply through by 3

$$3y - 1 = 27(x - 3)$$

$$3y - 1 = 27x - 81$$

$$3y - 27x + 80 = 0 \text{ (Equation of normal)}$$