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COURSE: MATH 104

MHS/MBBS

①  $y = 2x^2$  at point  $(1, 2)$

$$y = 2x^2 \quad \frac{dy}{dx} = 4x$$

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

$$m = 4$$

Equation of the tangent

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

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

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

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

$$y - 4x + 2 = 0 \therefore y = 4x + 2 = \underline{\underline{6}}$$

Equation of normal

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

$$m = \frac{-1}{m} = \frac{-1}{4}$$

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

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

$$4y - 8 + x - 1 = 0$$

$$4y + x - 9 = 0$$



②  $y = 3x^2 - 2x$  at point  $(2, 8)$

Sol

$$y = 3x^2 - 2x$$

$$\frac{dy}{dx} = 6x - 2 \quad (2, 8)$$

$$m = \left. \frac{dy}{dx} \right|_{x=2}$$

$$m = 6(2) - 2 = 10$$

③ Equation of the tangent

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

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

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

$$y - 10x + 12 = 0$$

④ Equation of the Normal

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

$$m = \frac{-1}{10} = -\frac{1}{10}$$

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

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

$$10y - 80 + x - 2 = 0$$

$$10y - 82 + x = 0$$





$$\textcircled{3} \quad y = \frac{x^3}{2} \quad \left( \begin{array}{c} -1 \\ x \end{array}, \begin{array}{c} -1/2 \\ y \end{array} \right)$$

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

$$m_1 = 3/2 x^2 = \text{Gradient}$$

$$m_1 = 3/2 \times 1 = 3/2 \quad x_1 = -1$$

The equation of the tangent

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

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

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

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

$$2y = 3x + 2$$

$$y = 1/2(3x + 2) \text{ eqn of the tangent.}$$

$$m_1 m_2 = -1$$

$$\frac{3}{2} m_2 = -1$$

$$m_2 = -2/3 = \text{gradient of the Normal.}$$

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

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



④  $y = 1 + 2x - x^2$  at point  $(-2, -3)$

$$y = 1 + 2x - x^2$$

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

$$m = \left. \frac{dy}{dx} \right|_{x = (-2)}$$

$$m = 1 - 2(-2) = 5$$

⑤ Equation of the tangent.

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

$$(y - (-3)) = 5(x + 2)$$

$$y + 3 = 5x + 10$$

$$y + 3 - 5x - 10 = 0$$

$$y - 5x - 7 = \underline{\underline{0}}$$

⑥ Equation of the Normal

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

$$m = -\frac{1}{m} = -\frac{1}{5}$$

$$y - (-3) = -\frac{1}{5}(x - (-2))$$

$$5y + 15 = -x - 2$$

$$5y + 15 + x + 2 = 0$$

$$5y + x + 17 = \underline{\underline{0}}$$



$$y = \frac{900}{1-2x}$$

$$y = \frac{1}{x} \quad \left( \begin{array}{c} 3, 1/3 \\ x \quad y \end{array} \right)$$

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

$$m_1 = \frac{1}{x^2} = \text{Gradient}$$

$$\text{at } x = 3 \quad m_1 = -\frac{1}{9}$$

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

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

$$y - 1/3 = \frac{-x + 3}{9}$$

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

$$9y = 6 - x$$

$$y = \frac{1}{9}(6 - x)$$

equation of tangent.

$$y = \frac{9x - 7}{1 - 2x} \quad \text{equation of the Normal.}$$