

Maths Assignment

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1 Find the equation of tangent and equation of normal
 $y = 2x^2$ at the point (1, 2)

Solu

$$\frac{dy}{dx} = 4x \quad \text{at } x=1$$
$$m = 4 \times 1 = 4$$

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

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

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

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

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

Equation of normal

$$m_1 m_2 = -1 \quad \therefore m_2 = \frac{-1}{m_1} \quad \therefore m_2 = -\frac{1}{4}$$

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

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

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

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

Solve

$$\frac{dy}{dx} = 6x - 2 \quad (\text{at } x=2)$$

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

$$m = 10$$

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

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

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

$$y - 10x + 12 = 0 \quad \text{--- equation of tangent}$$

$$m_1 m_2 = -1$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{10}$$

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

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

$$10y + 8 - 82 = 0 \quad \text{--- equation of normal}$$

3 $y = x^{3/2}$ at point $(-1, -1/2)$

Solution

Solution

$$\frac{dy}{dx} = \frac{3x^{1/2}}{2} \quad \text{at } x = -1$$

$$= \frac{3(-1)^{1/2}}{2} \quad m = \frac{3}{2}$$

$$m_1 m_2 = -1 \quad m_2 = \frac{-1}{m_1} = -\frac{1}{5}$$

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

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

$$5y+x+27=0 \quad \text{--- equation of normal}$$

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

Solve

$$\frac{dy}{dx} = x^{-1} = -x^{-1-1} \\ = -x^{-2} \quad \text{when } x=3 \\ -(3^{-2}) = m = -\frac{1}{9}$$

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

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

multiply through by 3

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

$$3y + \frac{1}{3}x - 2 = 0 \quad \text{--- equation of tangent}$$

$$m_1 m_2 = -1$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{-\frac{1}{9}} = 9 \quad m_2 = 9$$

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

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

multiply thru by 2

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

$$2y - 3x - 2 = 0 \quad \text{--- equation of a tangent}$$

$$m_1 = -1$$

$$m_2 = \frac{-1}{m_1}$$

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

$$m_2 = -2/3$$

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

$$y + \frac{2}{3}x + \frac{8}{6} = 0$$

$$y + \frac{2}{3}x + \frac{7}{6} \quad \text{equation of normal}$$

4 $y = 1 + x - x^2$ at point $(-2, -5)$

Solution

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

$$1 - 2(-2) = 1 + 4 = 5$$

$$m = 5$$

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

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

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

$$y - 5x - 5 = 0 \quad \text{--- equation of tangent}$$

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

$$y - \frac{1}{3} = 9x - 27$$

multiply through by 3

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

$$3y - 27x + 80 = 0 \quad \text{--- equation of normal}$$