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19/MHSC01/184
174 (SERIAL NO)

1.) $y = 2x^2$ at the point (1,2)

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

$$\frac{dy}{dx} = 4(1)$$

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

$$m = 4$$

$$m = 4 \quad x = 1 \quad y_1 = 2$$

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

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

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

Equation of a tangent

$$m_1 m_2 = -1$$

$$m_2 = -\frac{1}{4}$$

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

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

$$y + x - 9 = 0$$

Equation of a normal

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

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

$$\frac{dy}{dx} = 6(2) - 2$$

$$\frac{dy}{dx} = 10$$

$$m = 10$$

$$m = 10 \quad x = 2 \quad y_1 = 8$$

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

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

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

Equation of a tangent

(2)

$$m_1 m_2 = -1$$

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

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

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

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

$$m = \frac{3}{2} \quad x_1 = -1 \quad y_1 = -\frac{1}{2}$$

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

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

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

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

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

Equation of the tangent

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

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

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

$$6y + 4x + 3 + 4 = 0$$

$$6y + 4x + 3 + 4$$

$$6y + 4x + 7 = 0$$

Equation of a normal

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

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

$$\frac{dy}{dx} = 1 - 2(-2)$$

$$\frac{dy}{dx} = 5$$

$$m = 5 \quad x_1 = -2 \quad y_1 = -5$$

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

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

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

$$y - 5x - 5 = 0$$

Equation of a tangent

(3)

$$m_1 m_2 = -1$$

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

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

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

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

$$5y + x + 27 = 0$$

Equation of a normal

5.) $y = \frac{1}{x}$ at the point $(3, \frac{1}{3})$

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

$$\frac{dy}{dx} = -\frac{1}{3^2} = -\frac{1}{9}$$

$$m = -\frac{1}{9} \quad x_1 = 3 \quad y_1 = \frac{1}{3}$$

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

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

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

$$9y + x - 6 = 0$$

Equation of a tangent

$$m_1 m_2 = -1$$

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

$$m_2 = 9$$

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

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

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

$$3y - 1 = 3(9x - 27)$$

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

$$3y - 27x + 80 = 0$$

Equation of the normal