ARUBALUEZE GOODNESS EBUBE
19/MHS01/101
MBBS

MATHS ASSIGNMENT

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

Solution

a For equation of the tangent [x-1 y-2]

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

$$m_1 = \frac{dy}{dx}\Big|_{x=x_1}$$

$m_1 = 4(1) = 4$

$y - y_1 = m_1(x - x_1)$

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

$y - 2 = 4x - 4$

$\therefore y - 4x + 2 = 0$ is the equation of tangent

b.

b. For equation of the normal

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

$$y - y_1 = \frac{-1}{m_1}(x - x_1)$$

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

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

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

$4y - 8 = -x + 1$

$4y + x - 9 = 0$ is the equation of the normal

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

Solution

a For the equation of the tangent

[x = 2, y = 8]

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

$$m_1 = \frac{dy}{dx}\Big|_{x=x_1}$$

$m_1 = 6(2) - 2$

$m_1 = 12 - 2$

$\therefore m_1 = 10$

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

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

$y - 8 = 10x - 20$

$\therefore y - 10x + 12 = 0$ (equation of tangent)

For the equation of the normal

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

$y - y_1 = \frac{-1}{m_1}(x - x_1)$

$y - 8 = \frac{-1}{m_1}(x - x_1)$

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

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

$10(y-8) = -1(x-2)$

$10y - 80 = -x + 2$

$\therefore 10y + x - 82 = 0$ is the equation of the normal

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

Using quotient Rule

$x^3 = u$ & $2 = v$

$\frac{dy}{dx} = \frac{2(3x^2) - x^3(0)}{2^2} = \frac{6x^2}{4}$

$m = \frac{6x^2 - 0}{4}$

$m = \frac{6}{4}\ \frac{3}{2}$

$m = 3/2$

$y + 1/2 = 3/2 (x+1)$ (Multiply Through by 2)

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ (Equ of tangent)

b: $y - y_1 = -1/m (x - x_1)$

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

$3y + 3/2 = -2x - 2$

$3y + 2x + 3\frac{1}{2} = 0$ (Equ of a normal

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

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

$m = 1 - 2(-2)$

$m = 1 + 4$

$m = 5$

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

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

$y + 5 = 5x + 10$

equ of tangent $= y - 5x - 5 = 0$

b $y + 5 = -1/5\,(x + 2)$

$5y + 25 = -x - 2$

$5y + x + 27 = 0$ (equ of normal)

5 $Y = 1/x$ at point $(3, 1/3)$ — x, y

$m = \frac{dy}{dx} = \frac{x(0) - 1(1)}{x^2}$

$m = \frac{0 - 1}{x^2}$

$m = -1/x^2 = 1/(3)^2 = -1/9$

$Y - Y_1 = m(x - x_1)$

$Y - 1/3 = -1/9\,(x - 3)$

$9y - 3 = -x + 3$

$9y + x - 6 = 0$ (equ of tangent)

5b

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

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

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

$m_2 = 9$

$Y - 1/3 = 9(x - 3)$

$Y - 1/3 = 9x - 27$

$Y - 9x + 26.7 = 0$ (equ of the normal)