NAME: VICTORY - OPUTA FIDENCE DAUDEO
DEPT.: MEDICINE AND SURGERY
MATRIC NO: 19/MHS01/433
COURSE CODE: MAT 104

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

Solution.

$x_1 = 1$

$y_1 = 2$

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

$dy/dx / x = 1 = 4$

For eqn of tangent

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

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

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

$y - 2 = 4x - 4$

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

$y - 4x + 2 = 0$ eqn of tangent.

Eqn of normal

$m_1 \cdot m_2 = -1$

$4 m_2 = -1$

$m_2 = -1/4$

$\therefore y - y_2 = -1/m [x - x_1]$

$y - 2 = -1/4 [x - 1]$

$4y - 8 = -x + 1$

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

$4y + x - 9 = 0$ eqn of normal.

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

Solution.

$x_1 = 2$

$y_1 = 8$

$dy/dx = 6x - 2$

$dy/dx / x = 2 = 10 \quad \therefore m = 10$

For the eqn of tangent

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

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

$y - 8 = 10x - 20$

$y - 10x - 8 + 20 = 0$

$y - 10x + 12 = 0$ For the eqn of the tangent

Eqn of the normal

$y - y_1 = -1/m[x - x_1]$

$y - 8 = -10/10[x - 2]$

$10y - 80 = -x + 2$

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

$10y + x - 82 = 0$ for the eqn of the normal

3. $y = \frac{x^3}{2}$

$x = -1$

$y = -1/2$

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

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

For tangent;

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

$y - (-1/2) = 3/2[x - (-1)]$

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

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

$2y + 1 - 3 - 3x = 0$

$2y - 3x - 2 = 0$ For tangent.

For normal;

$y - y_1 = -1/m\,(x - x_1)$

$y - (-1/2) = -2/3\,(x - (-1))$

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

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

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

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

$6y + 4x + 7 = 0$ for the normal

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

solution

$x_1 = -2$

$x_2\ y_1 = -5$

$dy/dx = 1 - 2x$

$dy/dx\,/x = -2 = 1 - 2(-2) = 1 + 4 = 5 \therefore m = 5$

eqn for tangent;

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

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

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

$y + 5 = 5x + 10$

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

$y - 5x - 5 = 0$ for tangent

Eqn for normal;

$y - y_1 = -1/m\,(x - x_1)$

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

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

$5y + 25 = -x - 2$

$5y + x + 25 + 2 = 0$

$5y + x + 27 = 0$ for normal.

5. $y = 1/x$ at the point $(3, 1/3)$

Solution

$y_1 = 1/3$

$x_1 = 3$

$dy/dx = -1/x^2$

$dy/dx|_{x=3} = -1/3^2 = -1/9 \therefore m = -1/9$

For tangent;

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

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

$9y - 3 = -x + 3$

$9y + x - 3 - 3 = 0$

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

Eqn for normal;

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

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

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

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

$y - 9x - 1/3 + 27 = 0$

$y - 9x + 80/3 = 0$ for normal

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