MATRIC NO: 19/MHS01/079

MATHS ASSIGNMENT 7

1. $y = 2x^2$ $(1, 2)$

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

$\left.\frac{dy}{dx}\right|_{x=1} = 4(1) = 4$

$m = 4$

$x_1 = 1, \ y_1 = 2$

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

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

$y - 2 = 4x - 4$

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

$y - 4x + 2 = 0$

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

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

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

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

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

$4y + x - 9 = 0$

$\therefore 4y + x - 9 = 0$ is the equation to the normal.

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

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

$\left.\frac{dy}{dx}\right|_{x=2} \quad 6(2) - 2 = 10$

$m = 10$

$x = 2, \ y = 8$

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

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

$y - 8 = 10x - 20$

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

$y - 10x + 12 = 0$

$\therefore y - 10x + 12 = 0$ is the equation to the tangent.

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

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

$10y - 80 = -x + 2$

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

$10y + x - 82 = 0$

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

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

$\left.\frac{dy}{dx}\right|_{x=-1} = -\frac{1}{2}$

$m = -\frac{1}{2}$

$x = -1, \; y = -\frac{1}{2}$

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

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

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

$y + \frac{1}{2}x + \frac{1}{2} + \frac{1}{2} = 0$

$y + \frac{1}{2}x + 1 = 0$

$2y + x + 2 = 0$

$\therefore 2y + x + 2 = 0$ is the equation to the tangent.

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

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

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

$-\frac{y}{2} - \frac{1}{4} + x + 1 = 0$

$-2y - 1 + 4x + 4 = 0$

$2y + 1 - 4x - 4 = 0$

$2y + 4x - 3 = 0$

$\therefore 2y - 4x - 3 = 0$ is the equation to the normal.

4. $y = 1 + x - x^2$ $\quad (-2, -5)$

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

$\left.\frac{dy}{dx}\right|_{x=-2} = 1 - 2(-2) = 5$

$m = 5$

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

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

$y + 5 = 5x + 10$

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

$y - 5x - 5 = 0$

$\therefore y - 5x - 5 = 0$ is the equation to the tangent.

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

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

$5y + 25 = -x - 2$

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

$5y + x + 27 = 0$

$\therefore 5y + x + 27 = 0$ is the equation to the normal.

5. $y = \frac{1}{x}$ $\quad (3, \frac{1}{3})$

$\left.\frac{dy}{dx}\right|_{x=3} = \frac{1}{3}$

$m = \frac{1}{3}$

$x = 3, \; y = \frac{1}{3}$

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

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

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

$y - \frac{1}{3}x - \frac{1}{3} + 1 = 0$

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

$3y - x + 2 = 0$

$\therefore 3y - x + 2 = 0$ is the equation to the tangent.

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

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

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

$\frac{y}{3} + x - \frac{1}{9} + 3 = 0$

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

$3y + 9x - 28 = 0$

$\therefore 3y + 9x - 28 = 0$ is the equation to the normal.