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MAT 104
19/MHS01/395 Assignment

1) $y = 2x^2$
$(1, 2)$
x_1, y_1

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

$m = 4(1)$
$m = 4$

equation of tangent $= y - y_1 = m(x - x_1)$

$y - 2 = 4(x - 1)$
$y - 2 = 4x - 4$
$y - 4x + 2 = 0$ (equation of tangent)

b) Formula for eqn of a normal $= y - y_1 = \frac{-1}{m}(x - x_1)$
$y - 2 = \frac{-1}{4}(x - 1)$
$4y - 8 = -x + 1$
$4y + x - 9 = 0$ (equation of the normal)

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

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

$m = 6(2) - 2$
$m = 10$
$y - 8 = 10(x - 2)$
$y - 8 = 10x - 20$
$y - 10x + 12 = 0$ (eqn of the tangent)

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

$y - 8 = 10x - 20$

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

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ (eqn of the Normal)

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

a) $m = \frac{dy}{dx} \rightarrow \frac{2(3x^2) - x^3(0)}{2^2}$

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

$m = \frac{6(-1)^2}{4}$

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

$m = 3/2$

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

$2y + 1 = 3x + 3$

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

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

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

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

$3y + 2x + 3\frac{1}{2} = 0$ (Eqn of a Normal)

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

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

$m = 1 - 2(-2)$

$m = 1 + 4$

$m = 5$

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

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0$ (eqn of a tangent)

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

$5y + 25 = -x - 2$

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

5) $Y = \frac{1}{x}$ at Point $(3, \frac{1}{3})$ (x_1, y_1)

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

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

$m = \frac{-1}{x^2} = \frac{-1}{(3)^2} = \frac{-1}{9}$

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

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

$9Y - 3 = -x + 3$

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

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

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

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

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

$Y - 9x + 26 \cdot 7 = 0$ (eqn of the normal)