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Course: MAT 104
Assignment

1. $y = 2x^2$ point $(x_1, y_1) = (1, 2)$
Equation of tangent
$y = 2x^2$
$dy/dx = 4x$ and $x = 1$

$M_{Tan} = 4(1) = 4$//
$y - y_1 = m(x - x_1)$
$y - 2 = 4(x - 1)$
$y - 2 = 4x - 4$
$y = 4x - 4 + 2$
$y = 4x - 2$
Equation of normal
M_{normal} -> Gradient is the negative reciprocal of M_{Tan}
$M_{Tan} = 4$
$M_{Normal} = -\frac{1}{4}$

$y - y_1 = m(x - x_1)$
$y - 2 = -1/4(x - 1)$
$y - 2 = -\frac{x}{4} + \frac{1}{4}$
$y = -\frac{x}{4} + \frac{1}{4} + 2$
$y = -\frac{x}{4} + 9/4$
$y = -1/4x + 9/4$ ⟶

2. $y = 3x^2 - 2x$ point $(x_1, y_1) = (2, 8)$ Equation of tangent
$dy/dx = 6x - 2$ and $x = 2$
$M_{Tan} = 6(2) - 2 = 12 - 2 = 10$//
$y - y_1 = m(x - x_1)$
$y - 8 = 10(x - 2)$
$y - 8 = 10x - 20$
$y = 10x - 20 + 8$
$y = 10x - 12$//

Equation of normal

$m_{normal} = \frac{-1}{m_{Tan}} = \frac{-1}{10}$

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

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

$y - 8 = \frac{-x}{10} + \frac{2}{10}$

$y = -\frac{x}{10} + \frac{2}{10} + 8$

$y = -\frac{x}{10} + \frac{41}{5}$

(3) $y = x^3/2$ point $(-1, -1/2)$ (x_1, y_1)

equation of tangent

$dy/dx = \frac{3x^2}{2}$ and $x = -1$

M_{Tan} (slope of tangent) $= \frac{3}{2}(-1)^2 = \frac{3}{2}(1) = 3/2$

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

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

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

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

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

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

equation of normal

$M_{normal} = -\frac{2}{3}$

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

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

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

$y = -\frac{2x}{3} - \frac{2}{3} - 1/2$

$y = -\frac{2x}{3} - 7/6$

(4) $y = 1 + x - x^2$ point $(x_1, y_1) = (-2, -5)$

equation of tangent

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

$M_{tangent} = 1 - 2(-2) = 1 + 4 = 5$ //

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

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

$y + 5 = 5x + 10$

$y = 5x + 10 - 5$

$y = 5x + 5$ //

equation of normal

$M_{normal} = -\frac{1}{5}$

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

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

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

$y = \frac{-x}{5} - \frac{2}{5} - 5$

$y = \frac{-x}{5} - \frac{27}{5}$ //

(5) $y = 1/x$ at point $(x_1, y_1) = (3, 1/3)$

equation of tangent

$dy/dx = -x^{-2}$ at $x = 3$

$M_{tan} = -3^{-2} = -1/9$ //

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

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

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

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

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

$y = -x/9 + 2/3$ //

Equation of normal

$M_{norm} = +9$

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

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

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

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

$y = 9x + 80/3$ //