

Assignment

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

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

$x_1 = 1, y_1 = 2$

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

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

$y - 4x + 2 = 0$

Normal

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

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

$4y - 8 = -1(x - 1)$

$4y - 8 = -x + 1$

$4y + x - 9 = 0$

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

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

$y = 8, 6(2) - 2 = 10$

$\frac{dy}{dx} = 10$

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$

Normal

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

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

$10y - 80 = -1(x - 2)$

$10y - 80 = -x + 2$

$10y + x - 82 = 0$

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

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

$\frac{dy}{dx} = \frac{3}{2}(-1)^2$

$\frac{dy}{dx} = \frac{3}{2}$

$\frac{dy}{dx} \Big|_{x=-1} = \frac{3}{2}(-1)^2$

$m = 3/2$

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$

Normal

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

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

$2y + 1 = -\frac{4}{3}x - \frac{2}{3}$

$6y + 3 = -4x - 2$

$6y + 4x + 7 = 0$

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

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

$\frac{dy}{dx} \Big|_{x=-2} = 1 - 2(-2)$

$y = -5$

$m = 5$

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

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

$$y + 5 = 5x + 10$$

$$y - 5x - 5 = 0$$

(4) Normal

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

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

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

$$5y + x + 27 = 0$$

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

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

$$\left. \frac{dy}{dx} \right|_{x=3} = -3^{-2}$$

$$y = \frac{1}{3} \quad m = \frac{1}{9}$$

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

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

$$9y - 3 = x - 3$$

$$9y - x = 0$$

Normal

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

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

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

$$3y + 27x - 82 = 0$$

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