1 $y = 3x^2 - 2x$ at point $(2, 8)$

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

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

$$m = 6(2) - 2$$

$$= 12 - 2$$

$$= 10$$

for tangent of the curve.

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

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

$$y + \frac{1}{9}x - \frac{2}{3} = 0$$

multiply through by 9

$$9y + x - 6 = 0 //$$

for Normal of the Curve

$$m_2 = -1 \times 9$$

$$m_2 = +9$$

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

$$y - 9x - \tfrac{1}{3} + 27$$

$$y - 9x + \frac{80}{3}$$

multiply through by 3

$$3y - 27x + 80 = 0 //$$

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

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

$$\frac{dy}{dx} = \frac{2 \cdot 3x^2 - x^3 \cdot 0}{(2)^2 = 4}$$

$$\frac{dy}{dx} = \frac{6x^2}{4}$$

$$m = \frac{6(-1)^2}{4} = 3/2 //$$

for tangent

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

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

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

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

$$y - 3/2x - 1 = 0 \quad ; \quad 2y - 3x - 2 = 0$$

Equation for the normal

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

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

$$3y + 2x + 7/2 = 0$$

$$3y = -2x - 7/2$$

Equation of normal

$$m = -1/3/2 = -2/3$$

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

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

$$3y + 2x + 7/2 = 0$$

$$3y = -2x - 7/2$$

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

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

$$m = \frac{dy}{dx}\Big| x = 1$$

$$= 4(1) = 4$$

For tangent of the curve:

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

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

$$y - 2 = 4x - 4$$

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

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

For Normal of the curve

$$m_2 = -1/4$$

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

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

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

$$y + 1/4x - 9/4 = 0$$

tiply through by 4 $= 4y + x - 9 = 0$

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

$\frac{dy}{dx} = 0 + 1 - 2x$

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

$m = 1 + 4$

$m = 5$ //

for Tangent:

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

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

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

$y + 5 = 5x + 10$

$y - 5x + 5 - 10$

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

for Normal

$m = -1/5$

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

$y + 5 = -1/5 x + -2/5$

$y + 1/5 x + 5 + 2/5$

$y + \frac{1}{5}x + \frac{27}{5} = 0$

multiply through by 5

$5y + x + 27 = 0$

3) $y = 1/x$

$\frac{dy}{dx} = \frac{x \cdot 0 - 1 \cdot 1}{x^2}$

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

for tangent

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

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

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

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

$y - 8 = 10x - 20$

$y - 10x - 8 + 20$

$y - 10x + 12 = 0$ //

for Normal

$m = -1/10, \; m_2 = -1/10$

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

$y - 8 = -1/10 x + 1/5$

$y + \frac{1}{10} x - 8 - \frac{1}{5} = 0$

$y + \frac{1}{10} x - \frac{41}{5} = 0$

multiply through by 10

$10y + x - 82 = 0$