

$$4 \quad y = 1 + x - x^2 \text{ @ pt } (-2, -5)$$

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

$$m = \left. \frac{dy}{dx} \right|_{x=-2} = 1 - 2(-2) = 5 \neq 7$$

Equation of tangent

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

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

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

$$y = 5x + 5$$

For the normal equation

$$m = -1/5 = -1/5$$

Equation of the normal

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

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

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

$$5y = -x - 27$$

$$5 \quad y = 1/x \text{ @ pt } (3, 1/3)$$

$$y = x^{-1}$$

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

$$m = \left. \frac{dy}{dx} \right|_{x=3} = -3^{-2} = -1/9 = -1/9$$

Equation of tangent

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

$$y - 3 = -x + 3$$

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

$$9y = -x + 6$$

For the normal equation

$$m = -1/(-1/9) = 9$$

Equation of the normal

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

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

$$y - 9x + 80/3 = 0 /$$

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

$$y = 2x^2 \text{ @ pt } (1, 2)$$

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

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

Equation of tangent =

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

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

$$y = 4x - 2$$

For the normal equation =

$$m = -\frac{1}{4} = -\frac{1}{4}$$

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

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

$$4y + x - 9 = 0 \quad / \quad 4y = -x + 9$$

$$2 \quad y = 3x^2 - 2x \text{ @ the pt } (2, 8)$$

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

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

Equation of tangent

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

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

$$y = 10x - 12$$

For the normal equation

$$m = -\frac{1}{10} = -\frac{1}{10}$$

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

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

$$10y + x - 82 = 0 \quad /$$

$$10y = -x + 82$$

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

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

Let $u = x^2$ & $v = \frac{1}{2}x^{-1}$
 quotient product rule

$$\frac{dy}{dx} = \frac{u \frac{dv}{dx} - v \frac{du}{dx}}{v^2}$$

let $u = x^2$

$u = x^2$

$\frac{du}{dx} = 2x$

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

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

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

$m = \frac{3}{2}$

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

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

$$2y - 3x - 2 = 0$$

$$2y = 3x + 2$$

Equation for the normal

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

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

$$3y + 2x + \frac{7}{2} = 0$$

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

for the normal equation

$$m = -\frac{1}{\frac{3}{2}} = -\frac{2}{3}$$