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

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

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

$$4y - 8 - 1 + x = 0$$

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

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

$$y = 3x^2 - 2x$$

$$y = 6x - 2$$

$$dy/dx = 6x - 2$$

$$m = dy/dx \mid x = x_1$$

$$m = dy/dx \mid x = 2 = 3(2)^2 - 2 = 10$$

$$m = 10$$

a) Equation of the tangent

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

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

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

$$y - 10x - 8 + 20 = 0$$

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

b) Equation of the normal

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

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

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

$y = 1 + x - x^2$

$y = 1 - 2x$

$dy/dx = 1 - 2x$

$m = dy/dx \;/x = x_1$

$m = dy/dx \;/x = -2 = 1 - 2(-2) = 5$

$m = 5$

a) Equation of the tangent

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

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

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

$y + 5 = 5x + 10$

$y - 5x + 5 - 10 = 0$

$y - 5x - 10 = 0$

b) Equation of the normal

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

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

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

$5y + 10 = -x - 2$

$5y - x + 10 + 2 = 0$

$5y - x + 12 = 0$

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

$10y - 80 = -x + 2$

$10y + x - 80 - 2 = 0$

$10y + x - 82 = 0$

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

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

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

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

$m = \frac{dy}{dx}$ at $x = x_1$

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

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

a) Equation of the tangent

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

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

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

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

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

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

$2(y-1) = 3x$

$2y - 2 - 3x = 0$

$2y - 3x - 2 = 0$

b) Equation of the normal

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

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

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

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

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

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

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

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

$y = 1/x$

$y = 1$

$m = 1$

equation of the tangent

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

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

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

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

$y - x + 8/3 = 0$

b) equation of the normal

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

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

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

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

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

$y + x - 10/3 = 0$

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1. ~~Find the limit of the function $(x - \cos x / x)$ as $x \to 0$~~

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

$y = 2x^2$

$y = 4x$

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

$m = \frac{dy}{dx} / x = x_1$

$m = \frac{dy}{dx} / x = 1 = 4(1) = 4$

$m = 4$

a) Equation of the tangent

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

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

$y - 2 = 4x - 4$

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

$y + 2 - 4x = 0$

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

b) Equation of the normal

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