1. $y = 2x^2$ @ pt $(1, 2)$

$dy/dx = 4x$

$m = dy/dx \Big|_{x=1} = 4(1) = 4$

Equation of tangent =

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

$y - 2 = 4x - 4$

$y = 4x - 2$

For the normal equation

$m = -1/4 = -1/4$

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

$4y - 8 = -x + 1$

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

2. $y = 3x^2 - 2x$ @ the pt $(2, 8)$

$dy/dx = 6x - 2$

$m = dy/dx \Big|_{x=2} = 6(2) - 2 = 10$

Equation of tangent

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

$y - 8 = 10x - 20$

$y = 10x - 12$

For the normal equation

$m = -1/10 = -1/10$

$y - 8 = -1/10 (x - 2)$

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ /

$10y = -x + 82$

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

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

Let, P = Using quotient product rule

$$\frac{dy}{dx} = \frac{V \frac{du}{dx} - U \frac{dv}{dx}}{V^2}$$

$U = x^3$ $\quad \frac{du}{dx} = 3x^2$

$V = 2$ $\quad \frac{dv}{dx}$

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

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

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

Equation of tangent

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

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

$2y - 3x - 2 = 0$

$2y = 3x + 2$

for the normal equation

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

Equation for the normal

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

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

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

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

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

$dy/dx = 1 - 2x$

$m = dy/dx \Big|_{x=-2} = 1 - 2(-2) = 5$

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 $y = 1/x$ @ pt $(3, 1/3)$

$y = x^{-1}$

$dy/dx = -1x^{-2}$

$m = dy/dx \Big|_{x=3} = -3^{-2} = -1/3^2 = -1/9$

Equation of tangent

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0$

$9y = -x + 6$

For the normal equation

$m = -1/-1/9 = 9$

Equation of the normal

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

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

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

$y = 9x - 80/3$