Continuation of Number 5.

$m = -1/9$

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

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0$ which gives the eq of the tangent

For the eq of Normal

$M_1 M_2 = -1$

$\frac{-1}{9} \cdot M_2 = -1$

$M_2 = -1 / -1/9 = 9$

$y - y_1 = M_2 (x - x_1)$

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

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

$y - 9x - \frac{1}{3} + 27 = 0$

$y - 9x + \frac{80}{3} = 0$

$3y - 27x + 80 = 0$ which gives the eq of Normal

$M_2 = -2/3$

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

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

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

$3y + 2x + \frac{7}{2} = 0$ ~~that is the eq of~~

$6y + 4x + 7 = 0$. which gives the eq of the normal.

4. $y = 1 + x - x^2$ at point $[-2, -5]$

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

$\frac{dy}{dx}\Big|_{x=-2} \quad 1 + 2 \cdot -2 = -5$

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

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0$ which gives the eq of the tangent

for eq of the normal

$M_1 M_2 = -1$

$5 \cdot M_2 = -1$

$M_2 = -1/5$

$y - (-5) = -1/5 [x - (-2)]$

$5y + 25 = -x - 2$

$5y + x + 27 = 0$ which gives the eq of the normal.

(5). $y = 1/x$ at point $(3, 1/3)$

$y = x^{-1}$

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

$\frac{dy}{dx}\Big|_{x=3} \quad -3^{-2} = -\frac{1}{3^2} = -\frac{1}{9}$.

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$ - which gives the eq of target

for eq of normal

$M_1 M_2 = -1$

$10 \cdot M_2 = -1$

$M_2 = \frac{-1}{10}$

$y - y_1 = M_2(x - x_1)$

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ which gives the eq of the normal

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

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

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

$M = 3/2$

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ which gives the eq of the tangent.

For eq of the Normal

$M_1 M_2 = -1$

$\frac{3}{2} \cdot M_2 = -1$

$M_2 = \frac{-1}{3/2}$

Assignment.

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

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

$$\frac{dy}{dx}\Big|_{x=1} = 4 \cdot 1$$

$$= 4$$

$M = 4$.

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

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

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

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

which gives the eq of tangent.

for of Normal

$$M_1 M_2 = -1$$

$$4 \cdot M_2 = -1$$

$$M_2 = -1/4$$

$$y - y_1 = M_2(x - x_1)$$

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

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

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

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

which gives the eq of Normal.

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

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

$$\frac{dy}{dx}\Big|_{x=2} \quad 6 \cdot 2 = 2$$

$$= 10$$

$M = 10$