

Find (a) The equation of tangent and (b) normal
 $y = 2x^2$ at point $(1, 2)$

$$m = 4x \quad m = 4$$

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

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

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

$$y = 4x - 2 \quad \text{--- (a)}$$

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

$$m_2 = \frac{-1}{m_1} = \frac{-1}{4}$$

$$y - y_1 = m_2(x - x_1)$$

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

$$y = \frac{-1}{4}x + 2\frac{1}{4} \quad \text{--- (b)}$$

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

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

$$m = 6x - 2 = 4$$

$$y - 8 = 4(x - 2)$$

$$y - 8 = 4x - 8$$

$$y = 4x \quad \text{--- (a)}, \quad y - 4x = 0$$

$$m_2 = \frac{-1}{m_1} = \frac{-1}{4}$$

$$y - 8 = \frac{-1}{4}(x - 2)$$

$$y - 8 = \frac{-1}{4}x + \frac{1}{2}$$

$$y = \frac{-1}{4}x + 8\frac{1}{2} \quad \text{--- (b)}$$

$$4y + 1x - 34 = 0$$

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

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

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

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

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

$$y = \frac{3}{2}x + 1 \quad \dots \text{ (a)}$$

$$m_2 = \frac{4}{2} \cdot \frac{1}{2} = -1 \times \frac{2}{3} = -\frac{2}{3}$$

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

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

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

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

$$y = -\frac{2}{3}x - \frac{4-3}{6}$$

$$y = -\frac{2}{3}x - \frac{4-3}{6}$$

$$y = -\frac{2}{3}x - \frac{1}{6} \quad \dots \text{ (b)}$$

$$\text{or } 6y + 4x + 1 = 0$$

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

$$m = 1 + 1x - 2 = 1 - 2 = -1$$

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

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

$$y = -x - 7 \quad \dots \text{ (a)}$$

$$y + x + 7 = 0$$

$$m_2 = -1 = -1 = \text{pt}$$

$$y + x + 7 = 0$$

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

$$y+5 = x+2$$

$$y = x - 3 \quad \dots \text{b}$$

$$\text{or } y - x + 3 = 0$$

$$5. \quad y = \frac{1}{x} \quad \text{at point } (3, \frac{1}{3})$$

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

$$m = -\frac{1}{x^2}$$

$$\frac{dy}{dx} \bigg|_{x=3} \quad m = -\frac{1}{(3)^2} = -\frac{1}{9}$$

$$y - \frac{1}{3} = -\frac{1}{9}(x-3) \quad (9y + x - 6 = 0)$$

$$y - \frac{1}{3} = -\frac{1}{9}x + \frac{1}{3} \quad \text{or}$$

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

$$y = -\frac{1}{9}x + \frac{2}{3} \quad \dots \text{a}$$

$$m = -\frac{1}{x} = -\frac{1}{9} = -\frac{1}{9} \times \frac{9}{1} = \frac{-9}{1} = -9$$

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

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

$$3y - 1 = 27x - 81$$

$$3y - 27x - 81 = 0$$