

Assignment MTH 104

Oluwasegun Falana

MBBS

19/MHS01/172

Find (a) The equation of tangent and (b) Normal.

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

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

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

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

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

$$y = 4x - 2 \quad \dots (a)$$

$$\boxed{y - 4x + 2 = 0}$$

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

$$y - y_1 = \frac{-1}{4}(x - x_1)$$

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

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

$$\boxed{4y + 1x - 9 = 0}$$

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

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

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

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

$$y = 4x \quad \dots (a)$$

$$\boxed{y - 4x = 0}$$

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

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

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

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

$$\boxed{4y + 1x - 34 = 0}$$

(4) Continued

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

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

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

or ~~yes~~ $y = x - 3 \dots (b)$

$$\boxed{y - x + 3 = 0}$$

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

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

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

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

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

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

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

$$m_2 = \frac{+1}{-1} = -\frac{1}{9} = \frac{-1 \times 9}{1 \times -1} = \frac{-9}{-1} = 9$$

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

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

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

$$\boxed{3y - 27x - 81 = 0} \dots (b)$$

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

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

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

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

$$\boxed{2y - 3x - 2 = 0}$$

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

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

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

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

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

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

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

$$y = \frac{-2}{3}x - \frac{7}{6} \dots (b)$$

or $\boxed{6y + 4x + 7 = 0}$

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

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

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

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

$$y = -1x - 7 \dots (a)$$

or

$$\boxed{y + x + 7 = 0}$$

