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Course MAT 104  
Dept MBBS  
Matric No 19/MHS01/343

①  $y = 2x^2$  at points  $(x_1, y_1)$  Assignment  
 $(1, 2)$

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

dx

$$m = \left. \frac{dy}{dx} \right|_{x=1}$$

$$m = 4(1)$$

$$m = 4$$

$$\text{Equation of tangent} = y - y_1 = m(x - x_1)$$

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

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

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

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

For normal equation =

$$m = \frac{-1}{4}$$

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

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

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

$$y + \frac{1}{4}x - 2 - \frac{1}{4} = 0$$

Multiply through by 4

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

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

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

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

dx

$$m = \left. \frac{dy}{dx} \right|_{x=2}$$

$$m = 6(1) - 2$$

$$m = 4$$

$$\text{Equation of tangent} = y - y_1 = m(x - x_1)$$

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

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

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

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

$$= y - 4x = 0$$

$$\text{Equation of normal} =$$

$$m = \frac{-1}{4}$$

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

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

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

$$y + \frac{1}{4}x - 8 - \frac{1}{2} = 0$$

Multiply through by 4

$$4y + x - 32 - 2 = 0$$

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

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

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

~~$y = 2x^3$~~

~~$y = 2x^2$~~

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

~~$m = \frac{dy}{dx}$~~

~~$m = \frac{dy}{dx} \bigg|_x$~~

~~$m = \frac{dy}{dx} \bigg|_x$~~

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

$$m = \frac{dy}{dx}$$

$$\frac{dy}{dx} \bigg|_{x=-1}$$

$$m = \frac{3(-1)^2}{2}$$

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

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

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

$$\text{for tangent} = y - y_1 = m(x - x_1)$$

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

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

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

$$\text{find } y =$$

$$= y - 3/2x + 1/2 - 3/2 = 0$$

multiply through by 2

$$2y - 3x + 1 - 3 = 0$$

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

for normal equation =

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

$$m = -2/3$$

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

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

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

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

$$y + 2/3x + 1/2 + 2/3 = 0$$

multiply through by 3

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

$$y + 2x + 7/2 = 0$$

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

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

$$m = \frac{dy}{dx} \Big|_{x=-2}$$

$$m = 1 - 2(-2)$$

$$m = -1$$

$$\text{Equation of tangent } = y - y_1 = m(x - x_1)$$

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

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

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

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

$$= y + x + 7 = 0$$

For normal equation:

$$m = \frac{-1}{-1}$$

$$m = 1$$

$$y - y_1 = -1(x - x_1) \quad y - y_1 = m(x - x_1)$$

$$y - (-5) = -1(x - (-2)) \quad y - (-5) = 1(x - (-2))$$

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

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

$$y + 5 = x + 2$$

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

$$y - x + 3 = 0$$

⑤  $y = 1/x$  at point  $(3, 1/3)$

$$y = x^{-1}$$

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

$$m = \left. \frac{dy}{dx} \right|_{x=3}$$

$$m = -(3)^{-2}$$

$$m = -1/9$$

$$\text{Equation of tangent} = y - y_1 = m(x - x_1)$$

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

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

$$= y + x/9 - 1/3 - 1/3 = 0$$

$$= y + x/9 - 2/3 = 0$$

Equation of normal =

$$m = \frac{-1}{-1/9}$$

$$= 9$$

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

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

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

$$y - 9x + 27 - 1/3 = 0$$

$$y - 9x + 82/3 = 0$$