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DEPT: MBBS

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

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

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

$$m = 4(1) = 4.$$

a) Equation of tangent.

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

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

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

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

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

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

b) Equation of normal.

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

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

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

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

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

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

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

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

$$2) \quad y = 3x^2 - 2x \quad (2, 8)$$

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

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

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

$$m = 12 - 2 = 10$$

a) Equation of tangent:

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

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

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

$$y - 8 = 10x - 20$$

$$y - 10x - 8 + 20 = 0$$

$$y - 10x + 12 = 0$$

b) Equation of normal:

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

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

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

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

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

$$10y - 80 = -x + 2$$

$$10y + x - 80 - 2 = 0$$

$$10y + x - 82 = 0$$

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

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

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

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

a) Equation of tangent.

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

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

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

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

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

$$6x+6 = 4y+2$$

$$4y - 6x + 2 - 6 = 0$$

$$4y - 6x - 4 = 0$$

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

b) Equation of normal.

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

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

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

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

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

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

$$6y+3 = -4x-4$$

$$6y - 4x + 3 + 4 = 0$$

$$6y - 4x + 7 = 0$$

$$4) \cdot y = 1 + x - x^2 \quad (-2, -5)$$

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

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

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

$$m = 1 + 4 = 5$$

a) Equation of tangent

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

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

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

$$y + 5 = 5x + 10$$

$$y - 5x + 5 - 10 = 0$$

$$y - 5x - 5 = 0$$

b) Equation of normal

$$m = -\frac{1}{5}$$

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

$$y - (-5) = -\frac{1}{5}(x - (-2))$$

$$y + 5 = -\frac{1}{5}(x + 2)$$

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

$$5y + 25 = -x - 2$$

$$5y + x + 25 + 2 = 0$$

$$5y + x + 27 = 0$$

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

$$-\frac{1}{3} = m(x - x_1)$$

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

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

$$m = \frac{dy}{dx} \Big|_{m=3}$$

$$\frac{dy}{dx} = \frac{-1}{(3)^2} = \frac{-1}{9}$$

a) Equation of tangent:

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

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

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

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

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

$$27y - 9 = -3x + 9$$

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

$$27y + 3x = 0$$

b) Equation of normal:

$$m = -\frac{1}{m} \quad , \quad m = \frac{-1}{(-\frac{1}{9})} \quad , \quad m = 9$$

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

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

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

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

$$3y - 1 = 3(9x - 27)$$

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

$$3y - 27x - 1 + 81 = 0$$

$$3y - 27x + 80 = 0$$