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MBBS
MBS 19/MHS01/293
MAT 104

1. $y = 2x^2$ at point $(1, 2)$
2. $y = 3x^2 - 2x$ at point $(2, 8)$
3. $y = x^3/2$ at point $(-1, -1/2)$
4. $y = 1 + x - x^2$ at point $(-2, -5)$
5. $y = 1/x$ at point $(3, 1/3)$

Solution:

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

$dy/dx = 4x$

$m = dy/dx \; ; x = 1$

$m = 4x, \; m = 4(1) = 4$

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

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

$y - 2 = 4x - 4$

$y - 4x = -4 + 2$

$y - 4x = -2$

For normal equation

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

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

Cross Multiply;

$4y - 8 = x + 1$

$4y + x = +1 + 8$

$4y + x = 9$

11:08

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

$dy/dx = 6x - 2$

$m = dy/dx \quad \therefore x = 2$

$m = 6x - 2, \quad m = 6(2) - 2 = 10 \quad \therefore m = 10$

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

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

$y - 8 = 10x - 20$

$y - 10x = -20 + 8$

$y - 10x = -12$

For a normal equation

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

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

(Cross multiply)

$10y - 80 = x + 2$

$10y + x = 2 + 80$

$10y + x = 82$

~~$y = x^3/2$ at point $(-1, -1/2)$~~

$y = 3x^2$

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$\left.\frac{dy}{dx}\right|_{x=x_1} = 3$

Equation of tangent

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

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

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

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

$2y + 1 = 6x + 6$

$2y + 6x - 5 = 0$

$6x - 2y + 5 = 0$

Equation of normal

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

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

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

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

$6y + 3 = -2x - 2$

$6y + 2x + 5 = 0$

Screenshot has been saved to/storage/emulated/0/Pictures/Screenshot

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

Solution:-

$$y = 1 - 2x$$

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

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

$$= 1 - (-4)$$

$$m = 5$$

Equation at Tangent

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

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

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

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

Equation at normal.

$$y - y_1 = -1/m(x - x_1)$$

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

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

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

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

Solution;

$y = -1/x^2$

$dy/dx\big|_{x=3}$

$m = \frac{-1}{3^2} = -\frac{1}{9}$

Equation of Tangent

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

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0$

Equation of normal

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

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

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

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

$3y - 1 = 27x - 81$

$3y - 27x + 80 = 0$