MBBS.
MAT 104
19/mHS01/208
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1: $y = 2x^2$ at the point (1,2)

Soln

$y = 2x^2$

$\frac{dy}{dx} = 4x \quad (1,2)$

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

$m = 4$.

9. Equation of the tangent

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

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

$y-2 = 4x-4$

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

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

5. Equation of the normal.

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

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

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

$4y-8 = -x+1$

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

$4y+x-9=0$

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

Soln.

$y = 3x^2-2x$

$dy/dx = 6x-2 \quad (2,8)$

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

$m = 6(2)-2 = 10$

9. Equation of the tangent

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

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

$y-8 = 10x-20$

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

$y-10x+12=0$

5. Equation of the normal

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

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

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

$10y-80 = -x+2$

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

$10y+x-82=0$

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

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

$m_1 = 3/2x^2$ = Gradient

Gradient at point $x = -1$

$m_1 = \frac{3}{2} \times 1 = \frac{3}{2}$

9. The equation of the tangent of the point (x_1, y).

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

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

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

$2y + 1 = 3x + 3$

$2y = 3x + 2$

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

b. The equation of the normal

$m_1 m_2 = -1$

$3/2 m_2 = -1$

$m_2 = -2/3$ = gradient of the normal

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

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

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

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

$y = \frac{-4x - 7}{6}$

4. $y = 1 + x - x^2$ at the point $(-2, 0)$.

soln:

$y = 1 + x - x^2$

$dy/dx = 1 - 2x$

$m = \frac{dy}{dx}|x = (-2)$

$m = 1 - 2(-2) = 5$.

9. Equation of the tangent

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

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

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

$y + 5 = 5x + 10$

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

$y - 5x - 5 = 0$

b. Equation of the normal

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

$m = -1/m = -1/5$

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

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

$5y + 25 = -x - 2$

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

$5y + x + 27 = 0$

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

$dy/dx = -1/x^2$

$m_1 = \frac{-1}{x^2}$ = Gradient

Gradient at point $x = 3$

$m_1 = -1/9$

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

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

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

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

$9y - 3 = 3 - x$

$9y = 6 - x$

$y = 1/9(6 - x)$ equation of the tangent

b. equation of the normal.

$m_1 m_2 = -1$

$-1/9 m_2 = -1$

$-m_2 = -9$

$m_2 = 9$ gradient of the normal

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

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

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

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

$y = 27x - 81 + 1$

$y = 1/3(27x - 80)$