$M_1 M_2 = -1$

$5 \cdot M_2 = -1$

$M_2 = \frac{-1}{5}$

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

$5y + 25 = -x - 2$

$5y + x + 27 = 0 \Rightarrow$ Equation of the Normal

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

$y = x^{-1}$

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

$\left.\frac{dy}{dx}\right|_{x=3} = -3^{-2} = \frac{-1}{3^2} = \frac{-1}{9}$

$M = -\frac{1}{9}$

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

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0 \Rightarrow$ Equation of the tangent

$M_1 M_2 = -1$

$-\frac{1}{9} \cdot M_2 = -1$

$M_2 = \frac{-1}{-\frac{1}{9}} = 9$

$y - y_1 = M_2(x - x_1)$

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

$y - 9x - \frac{1}{3} + 27 = 0$

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

$3y - 27x + 80 = 0 \Rightarrow$ Equation of the Normal.

NAME: ADEKUNLE ABDULQUADRI AYOMIDE
MATRIC NO: 19/MHS01/028
COURSE: MAT 104
DEPT: Medicine and Surgery.

Assignment (Equation of tangent and Normal):

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

Soln

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

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

$$\frac{dy}{dx}\Big|_{x=1} = 4 \cdot 1 = 4$$

$M = 4$

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

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

$y - 2 = 4x - 4$

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

$y - 4x + 2 = 0 \Rightarrow$ Equation of tangent

For equation of Normal

$M_1 M_2 = -1$

$4 \cdot M_2 = -1$

$M_2 = -\frac{1}{4}$

$y - y_1 = M_2[x - x_1]$

$y - 2 = -1/4 (x - 1)$. Multiply through by 4

$4y - 8 = -1(x - 1)$

$4y - 8 = -x + 1$

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

$4y + 8 - 9 = 0 \Rightarrow$ Equation of the Normal.

NAME: ADEKUNLE ABDULQUADRI AYOMIDE
MATRIC NO: 19/MHS01/028
COURSE: MAT 104
DEPT: Medicine and Surgery.

Assignment (Equation of tangent and Normal):

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

Soln

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

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

$$\frac{dy}{dx}\Big|_{x=1} = 4 \cdot 1 = 4$$

$M = 4$

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

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

$y - 2 = 4x - 4$

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

$y - 4x + 2 = 0 \Rightarrow$ Equation of tangent

For equation of Normal

$M_1 M_2 = -1$

$4 \cdot M_2 = -1$

$M_2 = \frac{-1}{4}$

$y - y_1 = M_2[x - x_1]$

$y - 2 = -1/4 (x - 1)$, Multiply through by 4

$4y - 8 = -1(x - 1)$

$4y - 8 = -x + 1$

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

$4y + 8 - 9 = 0 \Rightarrow$ Equation of the Normal.

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

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

$\frac{dy}{dx}|_{x=2}$ $\quad 6 \cdot 2 - 2 = 10$

$M = 10$

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0 \Rightarrow$ Equation of Tangent

$M_1 M_2 = -1$

$10 \cdot M_2 = -1$

$M_2 = -\frac{1}{10}$

$y - y_1 = M_2(x - x_1)$

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0 \Rightarrow$ Equation of the Normal

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

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

$\frac{dy}{dx}|_{x=-1}$ $\quad \frac{3 \cdot (-1)^2}{2} = \frac{3}{2}$

$M = 3/2$

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

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0 \Rightarrow$ Equation of tangent

$M_1 M_2 = -1$

$\frac{3}{2} \cdot M_2 = -1$

$M_2 = \frac{-1}{\frac{3}{2}}$

$M_2 = -\frac{2}{3}$

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

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

$3y + 2x + \frac{3}{2} + 2 = 0$

$3y + 2x + \frac{7}{2} = 0$

Multiply through by 2

$6y + 4x + 7 = 0 \Rightarrow$ Equation of the Normal

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

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

$\frac{dy}{dx}|_{x=-2}$ $\quad 1 - 2 \cdot -2 = 5$

$M = 5$

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

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0 \Rightarrow$ Equation of the tangent

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

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

$\frac{dy}{dx}|_{x=2}$ $6 \cdot 2 - 2 = 10$

$M = 10$

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0 \Rightarrow$ Equation of Tangent

$M_1 M_2 = -1$

$10 \cdot M_2 = -1$

$M_2 = -\frac{1}{10}$

$y - y_1 = M_2(x - x_1)$

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0 \Rightarrow$ Equation of the Normal

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

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

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

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

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

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0 \Rightarrow$ Equation of tangent

$M_1 M_2 = -1$

$\frac{3}{2} \cdot M_2 = -1$

$M_2 = -\frac{1}{\frac{3}{2}}$

$M_2 = -\frac{2}{3}$

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

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

$3y + 2x + \frac{3}{2} + 2 = 0$

$3y + 2x + \frac{7}{2} = 0$

multiply through by 2

$6y + 4x + 7 = 0 \Rightarrow$ Equation of the Normal

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

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

$\frac{dy}{dx}|_{x=-2}$ $1 - 2 \cdot -2 = 5$

$M = 5$

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

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0 \Rightarrow$ Equation of the tangent

$M_1 M_2 = -1$

$5 \cdot M_2 = -1$

$M_2 = -\frac{1}{5}$

$y - (-5) =$

$5y + 2$

$5y + x +$

5 $y = \frac{1}{2}x$

$y = x$

$\frac{dy}{dx} =$

$\frac{dy}{dx}|$

$M =$

$y -$