NAME: Owolabi Oluwanifemi Mopelola

MAT 104

MEDICINE

19/MHS01/370

Find the equation and the normal

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

$y = 2x^2$

$dy/dx = 4x$

Slope $= 4(1)$ at $x = 1$

$= 4$

$y = 2(1^2) = 2$

coordinates $(1,2)$

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

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

$y - 2 = 4x - 4$

$y = 4x - 4 + 2$

$y = 4x - 2$

Equation of the tangent is $y = 4x - 2$

At the normal

$m_2 = -1/m_1$

$= -1/4$

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

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

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

$4y - 8 = -x + 1$

$4y = -x + 1 + 8$

$4y = -x + 9$

$4y = 9 - x$

∴ Equation of the normal is $4y = 9 - x$

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

$dy/dx = 6x - 2$

at point $(2,8)$

slope $= 6(2) - 2$

$= 12 - 2$

$= 10$

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

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

$y - 8 = 10x - 20$

$y = 10x - 20 + 8$

$y = 10x - 12$

Equation of the tangen is $y = 10x - 12$

At the normal

$m_2 = -1/m_1$

$= -1/10$

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

$y - 8 = -1/10(x - 2)$

$10(y - 8) = -1(x - 2)$

$10y - 80 = -x + 2$

$10y = -x + 2 + 80$

$10y = -x + 82$

∴ Equation of the normal is $10y = -x + 82$

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

$y = x^3/2 = \frac{1}{2}x^3$

$dy/dx = 3/2\, x^2 = 3x^2/2$

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

$= 3/2$

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

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

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

multiply through by 2

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

$2y + 1 = 3x + 3$

$2y = 3x + 3 - 1$

$2y = 3x + 2$

Equation of the tangent is $2y = 3x + 2$

Of the normal

$m_2 = -1/m_1 = -1/3/2 = -2/3$

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

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

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

multiply through by 6

$6y + 3 = -4(x + 1)$

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

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

$6y = -4x - 7$

Equation of the normal is

$6y + 4x + 7 = 0$

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

$dy/dx\ y = 1 - 2x$

$m = 1 - 2(-2)$

$= 1 + 4$

$= 5$

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

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

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

$y + 5 = 5x + 10$

~~$y + 5 = 5x$~~

$y = 5x + 10 - 5$

$y = 5x + 5$

Equation of the tangent is $y = 5x - 5$

$m_2 = -1/m_1 = -1/5$

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

$y - (-5) = -1/5\,[x - (-2)]$

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

$5y + 25 = -x - 2$

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

$5y + x + 27 = 0$

Equation of the normal is $5y + x + 27 = 0$

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

$y = x^{-1}$

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

$m_1 = -1(3)^2$

$= -1(9)$

$= -9$

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

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

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

multiply through by 3

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

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

$3y + 27x - 82 = 0$

Equation of the tangent is $3y + 27x - 82 = 0$

$m_2 = -1/m_1 = -1/-9$

$= 1/9$

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

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

multiply through by 9

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

$9y = x - 3 + 3$

$9y = x$

Equation of the normal is $9y = x$