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

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

When $x = 3$, $m = -1/9$

a) Equation of a tangent: $y - y_1 = m(x - x_1)$

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

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

$9y - 3 = -x + 3$

$\therefore 9y + x - 6 = 0$, which is the equation of a tangent.

b.) Equation of a normal: $y - y_1 = -1/m (x - x_1)$

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

multiply all through by 3

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

$3y - 1 = 27x - 81$

$\therefore 3y - 27x + 80 = 0$ which is the equation of the normal

Adeyemi Mayowa Esther 19/MHS01/040 MATH 104

Assignment

For the curves in problem 1 to 5 at the points given find
a.) the equation of the tangent
b.) the equation of the normal.

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

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

$m = dy/dx = 4x = 4$

a) Equation of tangent; $y - y_1 = m(x - x_1)$

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

$= y - 2 = 4x - 4$

$= y - 4x + 2 = 0$, which is the equation of the tangent.

b) Equation of the normal, $y - y_1 = -1/m(x - x_1)$

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

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

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

$= 4y + x - 9 = 0$, which is the equation of the normal.

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

$m = dy/dx = 6x - 2.$

when $x = 2$, $m = 10$

a.) Equation of tangent; $y - y_1 = m(x - x_1).$

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

$= y - 8 = 10x - 20$

$= y - 10x + 12 = 0$, which is the equation of the tangent.

b.) Equation of the normal; $y - y_1 = -1/m(x - x_1).$

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

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

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

$= 10y + x - 82 = 0$, which is the equation of a normal

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

$m = dy/dx$

Using quotient rule; $\frac{v\,dy/dx - u\,dy/dx}{v^2}$, $\frac{dy}{dx} = \frac{2(3x^2) - x^3(0)}{2^2} = \frac{3}{2}x^2$

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

$m = 3/2(-1)^2 = 3/2$

a) Equation of a tangent: $(y - y_1) = m(x - x_1)$

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

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

$= 2y - 3x - 2 = 0$, which is the equation of a tangent.

b) Equation of normal: $y - y_1 = -1/m(x - x_1)$

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

Multiply all through by 6.

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

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

$= 6y + 4x + 7 = 0$, which is the equation of the normal

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

$m = dy/dx = 1 - 2x$.

when $x = -2$, $m = 1 - 2(-2) = 5$.

) Equation of a tangent: $(y - y_1) = m(x - x_1)$.

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

$y + 5 = 5x + 10$

$= y - 5x - 5 = 0$, which is the equation of the tangent

Equation of a normal: $y - y_1 = -1/m(x - x_1)$.

$y + 5 = -1/5(x + 3)$.

$-5y - 25 = x + 3$

$-5y - x - 30 = 0$

$= 5y + x + 30 = 0$, which is the equation of the normal