

NAME: \_\_\_\_\_

**MAC 2311: Worksheet #13**

1) For each of the following implicitly defined functions, find  $\frac{dy}{dx}$ :

a)  $y^4 - 3y^3 - x = 3$  at  $(x, y) = (-5, 1)$ .

b)  $\cos(xy) = x - y$

2) Consider the function implicitly defined by  $y^4 = x + y$ .

a) Find an expression for the derivative  $\frac{dy}{dx}$ .

b) Find the equation of the line tangent to this function at the point  $(0,1)$ .

c) Find where the tangent line is vertical.

3) Without using a calculator, compute the following:

a)  $\log_2(8)$

b)  $\log_5\left(\frac{1}{25}\right)$

c)  $\log_{1/3}(9)$

4) If  $\log_b(A) = 5$ ,  $\log_b(B) = 3$ , and  $\log_b(C) = 2$ , compute

$$\log_b\left(\frac{A^2}{B^4C^3}\right).$$

5) Solve the equation  $\log_2(x^2 + 1) = 1$ .

6) Solve the equation  $5^{3x} = 7$ .

7) Find each of the following derivatives. What are you using in each case?

(a)  $\frac{d}{dx}(e^{7x}) =$

(b)  $\frac{d}{dx}(e^{f(x)}) =$

(c)  $\frac{d}{dx}(e^\pi) =$

8) Use the trick that  $2^x = e^{\ln(2^x)} = e^{x(\ln 2)}$ , to find a formula for

$$\frac{d}{dx}(2^x)$$