Name: _____

CLASSWORK 81

1. The temperature outside in the afternoon depends, roughly, on the time of day.   The neighborhood mad scientist came up with the following equation relating **f** (temperature in degrees fahrenheit) and **t** (time in hours, with noon = 0, 1 pm = 1, etc.):

$$t = 900 - \sqrt{f}$$

a) What seems wrong about the way this equation is written?

b) Which makes more sense to calculate,   dt/df   or   df/dt   ?

c) Calculate that derivative by solving for f.

d) Calculate that derivative **implicitly**, leaving the equation as it is.

Find each derivative **normally,** by solving for y, and then using **implicit differentiation,** to find it in terms of y. Then show they are equivalent.

Explicit (normal) differentiation	Implicit differentiation

2. $3y^4 = x$

Show they are equivalent.

3. $y^2 - 10y = x$

Show they are equivalent.

4. $6y - 5 = x$

Show they are equivalent.

5. $\ln y = x$

Show they are equivalent.

6. Find the slope of the tangent line to the circle $y^2 + x^2 = 25$ at the point   (3, 4).

7.   Find the derivative of each function **implicitly** and then **explicitly**. Then show they are really the same derivative.

	Explicit (normal) differentiation	Implicit differentiation

a) $x^2 + 3x + xy = 5$

b) $2y^2 + xy = x^2 + 3$

8.   Given the equation $x^2 - xy + y^3 = 13$

a) Find y' using implicit differentiation.

b) Find the x- values   for $y = 1$ and $y = 1.01$.

c) Find the average slope ($\Delta y/\Delta x$) between $y = 1$ and $y = 1.01$.

d) Calculate the exact slope at $y = 1$.

8. It is impossible to solve for y in the equation $\quad y^5 + 3x^2y^2 + x^4 = 12$

a) Find y' using implicit differentiation.

b) Use your derivative to calculate the slope at $\quad (1.4629, 1)$

9. Find the equation of the tangent line to the curve $\quad x^{2/3} + y^{2/3} = 4$ at the point $(-3\sqrt{3}, 1)$