

# Math 1A Sections 308-309

## Worksheet 5: October 5, 2009

### Warm-up Questions - work by yourself or with a neighbor

1. True or false?

If  $P$  is a polynomial of degree 6, then  $P^{(6)} = 0$ .

This notation means the 6th derivative. If it is true, explain why. If it is false, can you fix it?

2. What is the derivative of  $\sin(\sin x)$ .
3. What is the 100th derivative of  $\sin(2x)$ . (HINT: Write out the first few derivatives and look for a pattern.)

### Group problems: Chain Rule, Logarithmic Differentiation, Implicit Differentiation

1. Compute:

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

$$\frac{d}{dx}(3^{x^2})$$

$$\frac{d}{dx} \sqrt[4]{\frac{x^2 + 1}{x^2 - 1}}$$

2. Find  $y''$  in terms of  $x, y, y'$  for the curve  $\sqrt{x} + \sqrt{y} = 1$ .
3. Consider the curve defined by  $x^2 + y^2 = 25$ . Find the slope of the tangent to this curve at  $(3, 4)$ . Find a formula for  $d^2y/dx^2$ .
4. Compute  $\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$ .
5. Consider the curve defined by  $y^3 + xy + x^4 = 11$ . Find the slope of the tangent to this curve at  $(1, 2)$ . Find a formula for  $d^2y/dx^2$  that only involves  $x$  and  $y$ . (Your answer should not involve  $dy/dx$ .)