

# Fall 2004 MATH 171

## Week in Review V

*courtesy of David J. Manuel*

Section 3.4, 3.5, and 3.6

### Section 3.4

1. Use the definition of the derivative to find the derivative of  $f(x) = \sin 2x$
2. Assuming the derivatives of  $\sin x$  and  $\cos x$ , prove  $\frac{d}{dx}(\tan x) = \sec^2 x$ .
3. Given  $\lim_{x \rightarrow 0} \sin x = 0$  and  $\lim_{x \rightarrow 0} \cos x = 1$ , prove that  $f(x) = \sin x$  is continuous for all  $x$ .

### Section 3.5

4. Prove that the derivative of an even function is an odd function.
5. Prove: if  $(x - a)^2$  is a factor of a polynomial function  $p(x)$ , then  $x - a$  is a factor of  $p'(x)$ .

### Section 3.6

6. Differentiate the equation  $\frac{y - a}{x - b} = c$  implicitly to find  $y'$ . Explain the significance of your answer.
7. Prove the power rule works for rational exponents (i.e., prove that if  $n = \frac{p}{q}$ , then  $\frac{d}{dx}(x^n) = nx^{n-1}$ ).