

Math 180  
Fall, 2008

Name \_\_\_\_\_

Homework #7  
Due Wednesday, October 8  
No late papers accepted! No excuses!

1. Find each derivative.

a)  $y = x^2 \cos x - 2x \sin x - 2 \cos x$

b)  $y = \frac{\tan x}{1 + \tan x}$

c)  $y = x^2 \sec\left(\frac{1}{x}\right)$

d)  $y = \sin^2 x$

e)  $y = \sin(x^2)$

f)  $y = \cos(\sin(2x))$

g)  $y = \sqrt{1 + \cos^2(3x)}$

2. Find  $\lim_{x \rightarrow 0} \sin\left(\frac{\pi + \tan x}{\tan x - 2 \sec x}\right)$

3. Are there any points on the curve  $y = x - e^{-x}$  where the slope is 2? If so, find them.
4. Find equations for the tangent and normal lines to the curve  $y = 1 + \cos x$  at the point  $(\pi/2, 1)$ . Sketch the curve, tangent, and normal together, labeling each with an equation.

5. For what value or values of the constant  $m$ , if any, is

$$f(x) = \begin{cases} \sin(2x), & x \leq 0 \\ mx, & x > 0 \end{cases}$$

- a) Continuous at  $x = 0$ ?
- b) Differentiable at  $x = 0$ ?

Give reasons for your answers.