Math F200X Midterm 2 Fall 2004

Name: _____

Id: _____

Rules:

You have 60 minutes to complete the exam.

Partial credit will be awarded, but you must show your work.

No calculators, books, notes, or other aids are permitted.

Turn off anything that might go beep during the exam.

If you need extra space, you can use the back sides of the pages. Please make it obvious when you have done so.

Good luck!

Problem	Possible	Score
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

1. (20 points)

Compute the following derivatives. Do not simplify your answers unless you really want to.

a $\dfrac{d}{dx}\ \arctan\left(\dfrac{1-x}{1+x}\right)$

b $\dfrac{d}{dt}\ t^3 e^t \tan(2t)$

c $\dfrac{d}{dx}\ x^x$ *Hint:* $a^b = e^{\ln(a^b)}$

2. (20 points)

Compute the derivative of

$$\ln\left(\sqrt{\frac{\cos(3x)\sin(2x)}{\sin(x)}}\right).$$

Express your answer in terms of the functions $\tan$ and $\cot$ if possible. *Hint:* Use logarithm rules to simplify the expression before you take any derivatives.

3. (20 points)

Find the tangent line to the curve

$$\cos(y) + y = x^9$$

going through the point $(1, 0)$.

4. (20 points)

A particle is moving along the x axis with position at time t given by $x(t) = te^{kt}$ where k is a constant.

a Determine the values of t where the velocity of the particle is zero.

b Compute $x''(t)$.

c Compute $x''(t) - 2x'(t) + x(t)$.

d Use your answer from part **c** to determine a value of k such that

$$x''(t) - 2x'(t) + x(t) = 0$$

for all values of t.

5. (20 points)

a Find all values of x such that the tangent line of the graph of the function

$$f(x) = e^{2x}(\sin(2x) - \cos(2x))$$

is horizontal.

b Find y'' by implicit differentiation if

$$y + e^y = x.$$