Math F200 Midterm 2 Spring 2010

Name: _____

Student 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	30	
2	20	
3	20	
4	20	
5	10	
Total	100	

1. (30 points)

Compute the derivatives on this and the following page.

a $\dfrac{d}{dx}\, e^{\tan(x)}$

b $\dfrac{d}{dx}\, \cos(xe^{-2x})$

c $\dfrac{d}{dx}\, (\arctan(x^2))^3$

d $\dfrac{d}{dx}\ \sec(\sqrt{1+x^2})$

e $\dfrac{d}{dx}\ \ln\left(\dfrac{x^4(2-x)}{4-x}\right)$ *Hint:* This one is not hard.

f $\dfrac{d}{dx}\ \sin(x)^x$ *Hint:* Try logarithmic differentiation.

2. (20 points)

Find the linearization of the function

$$f(x) = \sin(x)$$

at $x = \pi/4$.

Use the linearization to find an approximate value for

$$\sin\left(\frac{\pi}{4} + \frac{1}{10}\right).$$

3. (20 points)

A 16 foot ladder is sliding down a wall. The bottom of the ladder is sliding away from the wall at a rate of 3 ft/s. What is the velocity of the top of the ladder at time $t = 2$ if the bottom of the ladder is 5 ft from the wall at time $t = 0$?

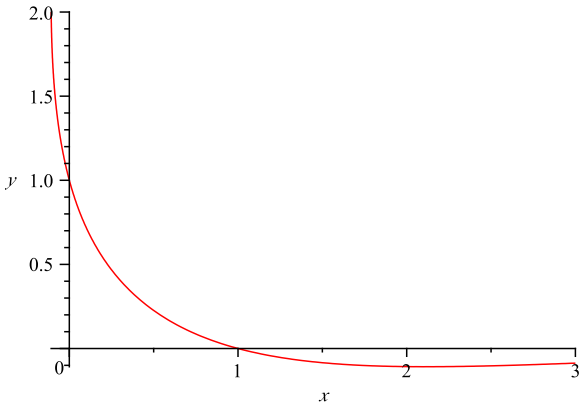
4. (20 points)

Consider the curve defined by

$$ye^x + xe^y = 1.$$

a Show that the point $P = (1, 0)$ lies on this curve.

b This curve is graphed below. Sketch the tangent line passing through P.



c What is the slope of the line you sketched in part **b**?

5. (10 points)

Suppose

$$f(x) = ax + be^{cx}$$

where a, b, and c are constants. Find values of a, b, and c such that

$$f(0) = 2$$
$$f'(0) = 10$$
$$f''(0) = 18.$$