MATH 141 (Section 11 & 12) Prof. Meade

Exam 3 – Practice October 26, 2007 University of South Carolina Fall 2007

Name: _______ Section: 011 / 012 (circle one)

Instructions:

- 1. There are a total of 5 problems on 5 pages. Check that your copy of the exam has all of the problems.
- 2. Calculators may not be used for any portion of this exam.
- 3. You must show all of your work to receive credit for a correct answer.
- 4. Your answers must be written legibly in the space provided. You may use the back of a page for additional space; please indicate clearly when you do so.

Problem	Points	Score
1	40	
2	30	
3	10	
4	10	
5	10	
Total	100	

Study Smart!

- 1. (40 points) Find $\frac{dy}{dx}$ in each of the following. Indicate each time you use Implicit Differentiation (ID) or Logarithmic Differentiation (LD).
 - (a) $y = \sin(\tan(3x))$

(b) $x^3 + y^3 = 3xy^2$

(c) $y = \ln(\sin^2(x))$

(d)
$$y = \frac{(x^2 - 8)^{1/3}\sqrt{x^2 + 1}}{x^6 - 7x + 5}$$

(e) $y = e^{7x} + \arcsin(2x)$

2. (30 points) Evaluate each of the following limits. Identify each indeterminate form that you encounter and indicate each time you use l'Hôpital's Rule.

(a)
$$\lim_{x \to 0} \frac{e^x - 1}{\sin(x)}$$

(b) $\lim_{x \to 0^+} \frac{1 - \ln(x)}{e^{1/x}}$
(c) $\lim_{x \to \infty} xe^{-x}$
(d) $\lim_{x \to 0} \left(\frac{1}{x} - \frac{1}{e^x - 1}\right)$
(e) $\lim_{x \to \infty} \left(1 - \frac{3}{x}\right)^x$

3. (10 points) A 13-ft ladder is leaning against a wall. If the top of the ladder slips down the wall at a rate of 2 ft/s, how fast will the foot be moving away from the wall when the top is 12 ft above the ground.

4. (10 points) Find the local linear approximation of $f(x) = \frac{1}{2+x}$ at $x_0 = 1$.

5. (10 points) The side of a square is measured with a possible percentage error of $\pm 2\%$. Use differentials to approximate the percentage error in the area.

