MA 114 - Calculus II

Exam 1

7 February 2008

Name:_____

Score:_____ /100 Points

Instructions:

- You may not use any outside assistance on this exam. You may not use books, notebooks, other people's exams, or any other materials to cheat on this exam.
- You may not use a graphing calculator on this exam.
- The use of electronic equipment such as mp3 players, ipods, cell phones and other electronic devices during the exam is prohibited.
- If you are caught cheating on the exam, you will be given a 0 for a grade.
- Write clearly during the exam and fully erase or mark out anything you do not want graded.
- You must give exact answers and fully reduce fractions to receive full credit. Approximate and unreduced answers will receive only partial credit.
- **You must show all your work to receive full credit unless otherwise stated.**

1. (3 points each) Calculate the following integrals. You do not need to show work for this question

   (a) $\int \sin(x)dx =$ _____

   (b) $\int \frac{1}{x}dx =$ _____

   (c) $\int \frac{1}{\sqrt{1-x^2}}dx =$ _____

   (d) $\int \frac{1}{1+x^2}dx =$ _____

2. (3 points each) Calculate the following derivatives. You do not need to show work for this question

   (a) $\frac{d}{dx}2^{3^x} =$ _____

   (b) $\frac{d}{dx}x^{2x} =$ _____

   (c) $\frac{d}{dx}\log_4(3x) =$ _____

   (d) $\frac{d}{dx}\tan x =$ _____

3. Consider the function $s(x) = 3\sqrt{4x-8}$.

   (a) (4 points) Find $s^{-1}(x)$

   (b) (3 points) What is the domain of s^{-1}?

   (c) (3 points) What is the range of s^{-1}?

4. (10 points) Find the equation of the tangent line to the curve $f(x) = e^x \sin(\frac{\pi x}{2})$ at the point $(1, e)$. You may leave your final answer in either point-slope or slope-intercept form.

5. (6 points) Calculate the following limit:

$$\lim_{x \to \infty} \frac{(\ln x)^2}{x}.$$

6. (5 points) Find the exact value of the expression:

$$\cos\left[\frac{3}{2}\sin^{-1}\left(\frac{1}{2}\right)\right].$$

7. (5 points each) Compute the following integrals.

(a) $\int_0^2 \frac{5x}{x^2+1} dx$

(b) $\int 3^{\cos\theta} \sin\theta d\theta$

8. (3 points each) Answer true or false to the following questions. You must write the complete word to receive credit for the problem. You do not need to show your work on this problem.

   (a) The function $y = x^3 - x$ is a one to one function.

   (b) $\pi^{\sqrt{3}} = e^{\sqrt{3}\ln\pi}$

   (c) $\frac{d}{dx}\ln(7) = \frac{1}{7}$

   (d) $\arcsin(\sin(3\pi/2)) = 3\pi/2$.

   (e) $\log_2 4 = \frac{\ln 4}{\ln 2}$

9. (10 points) Find the absolute maximum value of the function $t(x) = x - e^x$.

10. (5 points each) Compute the following integrals using integration by parts.

(a) $\int x \ln x dx$

(b) $\int e^t \sin t dt$

11. Extra Credit: (5 points) Find the area of the region bounded by the curves:

$$y = e^x,\ y = \pi^x,\ x = 1,\ x = -1$$

and write your answer as the sum of two fractions.