Math 1131
Autumn 2012
Midterm 2
Form A

Name: _____

Name.nn: _____

Lecturer: _____

Rec. Instructor: _____

Rec. Time: _____

Instructions:

- You have **55 minutes** to complete this exam. It consists of 8 problems on 8 pages including this cover sheet and is worth a total of 100 points. The value of each question is listed below and with each question.
- You may not use any books or notes during this exam.
- Calculators are permitted EXCEPT those calculators that have symbolic algebra or calculus capabilities. In particular, the following calculators and their upgrades are not permitted: TI-89, TI-92, and HP-49. In addition, neither PDAs, laptops nor cell phones are permitted.
- Make sure to read each question carefully.
- Please **write clearly** and make sure to **justify your answers**. Correct answers with no supporting work may receive no credit. Unless otherwise stated, solutions found by graphing will receive no credit.
- Please write your answers on the indicated lines.
- A random sample of graded exams will be xeroxed before being returned.

Problem	Point Value	Score
1	14	
2	15	
3	15	
4	12	
5	6	
6	12	
7	12	
8	14	
Total	100	

(1). Find the following derivatives (You do not need to simplify your answers):

(a) (4 points) $y = \dfrac{\ln(2x+1)}{e^{3x}}$

Answer (1a): $y' =$ _____

(b) (4 points) $f(x) = \log_6 \sqrt{x^2+1}$

Answer (1b): $f'(x) =$ _____

(c) (6 points) $f(x) = (x+1)^{x^2+1}$

Answer (1c): $f'(x) =$ _____

(2). (15 points) Let $f(x) = 3x^5 - 45x^3$.

Use derivatives and a sign graph to determine the interval(s) on which $f(x)$ is increasing and on which $f(x)$ is decreasing AND indicate where $f(x)$ has relative maximum and relative minimum points. (If there are none, please say so).

Answer (2): increasing: _____

decreasing: _____

rel. max. points(s) at $x =$ _____

rel. min. point(s) at $x =$ _____

(3). (15 points) Let $f(x) = -x^4 + 36x^3 - 36x + 7$.

Use derivatives and a sign graph to determine the interval(s) on which $f(x)$ is concave up and on which $f(x)$ is concave down AND indicate where $f(x)$ has inflection point(s). (If there are none, please say so).

Answer (3): concave up: _____

concave down: _____

inflection point(s) at $x =$ _____

(4). Let $f(x) = x^3 - x^2 - x + 10$.

(a) (9 points) Use the Second Derivative Test to find where the relative maximum(s) and the relative minimum(s) of $f(x)$ occur.

Answer (4a): rel. max(s). at $x =$ _____

rel. min(s). at $x =$ _____

(b) (3 points) Find where the absolute maximum and absolute minimum for $f(x)$ occur over the interval $[-1, 0]$.

Answer (4b): absolute max(s). at $x =$ _____

absolute min(s). at $x =$ _____

(5). Let $f(x) = \dfrac{15x^3 + 35x^2 - 100x}{56x - 2x^2 - 4x^3}$.

(**a**) (2 points) Find the x-intercept(s) and y-intercept of $f(x)$. (If there are none, please say so).

Answer (5a): x-intercept(s): _____

y-intercept: _____

(**b**) (2 points) Find all horizontal asymptotes of $f(x)$. (If there are none, please say so).

Answer (5b): horizontal asymptote(s): _____

(**c**) (2 points) Find all vertical asymptotes of $f(x)$. (If there are none, please say so).

Answer (5c): vertical asymptote(s): _____

(6). (12 points) Use implicit differentiation to find $\frac{dy}{dx}$ for the equation

$$x^2 + 4xy + 3e^y = 1$$

Answer (6): $\frac{dy}{dx} =$ _____

(7). (12 points) Use logarithmic differentiation to find $\frac{dy}{dx}$ where

$$y = \frac{(x-3)^5}{(3x-7)^3(4x+5)}$$

Answer (7): $\frac{dy}{dx} =$ _____

(8). (14 points) Approximate $\sqrt{8.3}$ by using differentials. (Round your answer to 4 decimal places).

Answer (8): _____