

UCB Math 1B, Fall 2009: Midterm 1

Prof. Persson, October 5, 2009

Name:	_____	Grading	
SID:	_____	1	/ 5
Section:	Circle your discussion section below:	2	/ 5
		3a	/ 3
		3b	/ 3
		3c	/ 4
		4a	/ 5
		4b	/ 5
		5	/ 5
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			/35

Sec	Time	Room	GSI
01	MW 8am - 9am	75 Evans	G. Melvin
02	MW 8am - 9am	5 Evans	T. Wilson
03	MW 10am - 11am	75 Evans	D. Cristofaro-Gardiner
04	MW 10am - 11am	3113 Etcheverry	E. Kim
05	MW 11am - 12pm	81 Evans	G. Melvin
06	MW 12pm - 1pm	5 Evans	T. Wilson
07	MW 1pm - 2pm	2 Evans	A. Tilley
09	MW 2pm - 3pm	247 Dwinelle	D. Cristofaro-Gardiner
10	MW 3pm - 4pm	4 Evans	E. Kim
11	MW 4pm - 5pm	3113 Etcheverry	A. Tilley
12	TT 11:30am - 2pm	230C Stephens	L. Martirosyan

Other/none, explain: _____

Instructions:

- One double-sided sheet of notes, no books, no calculators.
- Exam time 50 minutes, do all of the problems.
- You must justify your answers for full credit.
- Write your answers in the space below each problem.
- If you need more space, use reverse side or scratch pages.
Indicate clearly where to find your answers.

1. (5 points) Evaluate the integral:

$$\int \arctan x \, dx$$

2. (5 points) Determine if the integral below is convergent or divergent. If it is convergent, evaluate it.

$$\int_e^{\infty} \frac{1}{x(\ln x)^3} \, dx$$

3. Determine if the sequences $\{a_n\}$ below converge or diverge. If they converge, find the limit.

a) (3 points) $a_n = e^{1/n}$

b) (3 points) $a_n = \frac{(2n-1)!}{(2n+1)!}$

c) (4 points) $a_n = \frac{(-1)^n n^3}{n^3 + 2n^2 + 1}$

4. Consider the region bounded by the curves $y = 0$, $x = -1$, $x = 1$, and

$$y = \frac{1}{(x^2 + 1)^{3/2}}.$$

a) (5 points) Find the area A of the region. Hint: Use trigonometric substitution.

b) (5 points) Find the centroid of the region.

5. (5 points) If f is a quadratic function $f(x) = ax^2 + bx + 1$, and

$$\int \frac{f(x)}{x^2(x+1)^3} dx$$

is a rational function, find the value of b .