

MARK BOX		
PROBLEM	POINTS	
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
LSUvsUSC		3
%	100	

NAME: \_\_\_\_\_

SSN: \_\_\_\_\_

Section 007 (MW 12:20 pm)

or

Section 008 (MW 2:30 pm)

---

**INSTRUCTIONS:**

- (1) To receive credit you must:
    - (a) work in a logical fashion, show all your work, indicate your reasoning
    - (b) when applicable put your answer on/in the line/box provided
    - (c) if no such line/box is provided, then box your answer
  - (2) The MARK BOX indicates the problems along with their points. Check that your copy of the exam has all of the problems.
  - (3) You may **not** use a calculator, books, personal notes. Give exact answers: for example, write  $\ln 2$  instead of .6931, write  $\sqrt{2}$  instead of 1.414, write  $\pi$  instead of 3.1415, write  $\frac{1}{3}$  instead of 0.3333.
  - (4) During this exam, do not leave your seat. If you have a question, raise your hand. When you finish: turn your exam over, put your pencil down, and raise your hand.
  - (5) This exam covers (from *Calculus* by Varberg, Purcell, Rigdon, 8<sup>th</sup> ed.): Chapters 8 and 9 .
- 

**Problem Inspiration:**

1. class handout of 119 integrals
  2. homework problem
  3. class handout of 119 integrals
  4. homework problem, an example from class, Girardi's Spring 03 exam 2
  5. an example from class
  6. class handout of 119 integrals, homework problem, an example from class
  7. homework problem
  8. homework problem, Girardi's Spring 03 exam 2
  9. homework problem
  10. homework problem
-

1.

$$\int \sec^3 x \tan^3 x dx = \qquad +C$$

2.

$$\int \frac{x \, dx}{\sqrt{3x+4}} =$$

$+C$

3.

$$\int \frac{x^2 dx}{\sqrt{4-x^2}} =$$

$+C$

4.

$$\int e^{2x} \cos x \, dx =$$

$+C$

5.

$$\int \frac{5x^3 - 3x^2 + 2x - 1}{x^4 + x^2} dx = \qquad +C$$

HINT:  $x^2 = (x - 0)^2$

**6a.** Let  $n \in \mathbb{N} = \{1, 2, 3, 4, 5, \dots\}$ . Derive a reduction formula for the below integral.

$$\int (\ln x)^n dx =$$

HINT: Your solution should look like:

$$\int (\ln x)^n dx = (\text{some function of } x) + (\text{maybe a constant}) \int (\ln x)^{\text{some number less than } n} dx$$

**6b.** Use your solution to **6a** to find the below 2 integrals.

$$\int \ln x dx = \qquad \qquad \qquad +C$$

$$\int (\ln x)^2 dx = \qquad \qquad \qquad +C$$

7.

$$\lim_{x \rightarrow \infty} \frac{x^{10000}}{e^x} =$$

EXPLAIN YOUR ANSWER!

8.

$$\lim_{x \rightarrow \infty} x^{\frac{1}{x}} =$$

9.

$$\int_2^{\infty} \frac{\ln x \, dx}{x^2} =$$

HINT: integration by parts

10.

$$\int_{-2}^0 \frac{dx}{2x+3} =$$

HINT: make a (very) rough sketch of the integrand (i.e., the function you need to integrate - where is it not defined).