

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

NAME: _____

SSN: _____

Section 001 (MW 9:05)

or

Section 002 (MW 10:10)

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 π 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, 8th ed.): Chapter 7 (excluding 7.6), Section 8.1, and Section 8.2 .

Problem Inspiration:

1. an example from class
2. homework problem § 7.4 # 5
3. homework problem § 7.1 # 41
4. homework problem § 7.9 # 13
5. homework problem § 7.9 # 23
6. homework problem § 8.1 # 17
7. an example from class
8. Prof. Kustin's Fall 2001 Math 142 Exam 1 # 4
9. an example from class
10. Take Home Quiz (warning: numbers are changed).

1. A function $y = f(x)$ is sketched below.

Sketch the graph of its inverse function, i.e. sketch the graph of $y = f^{-1}(x)$, on the same grid.

2. Solve the equation

$$2\log_9\left(\frac{x}{3}\right) = 1$$

for x . Your answer should **not** have a logarithm nor exponential in it.

ANSWER: $x =$

3a. For $x > 0$, the natural logarithm of x , i.e. $\ln x$, is **defined** by the definite integral

$$\ln x = \int$$

3b. Solve the equation

$$\int_{\frac{1}{3}}^x \frac{dt}{t} = 2 \int_1^x \frac{dt}{t}$$

for x . Your answer should **not** have a logarithm nor exponential in it.

ANSWER: $x =$

4.

$$D_x [3 \ln (1 + e^{5x})] =$$

5.

$$D_x (x^{1+x}) =$$

6.

$$\int \frac{3x^2 + 2x}{x + 1} dx =$$

7.

$$\int \sin^4(17x) \cos^3(17x) dx =$$

8. The volume of the solid generated by revolving the region bounded by:

$y = e^x$ and the x -axis and the y -axis and $x = 1$

about the x -axis is

9. The solution to the differential equation

$$\frac{dy}{dt} = 12y(t)$$

subject to the condition that $y(2) = 7$ is

$y(t) =$

.

10. The rate of decay of a radioactive substance is proportional to the amount of such substance present. Today we have P_0 grams of a radioactive substance. Given that one-fourth of the substance decays every 7 years, how much will be left t years from today? *Clearly explain your notation.*

ANSWER:

grams