

MARK BOX		
PROBLEM	POINTS	
1 a-j	10	
2	10	
Extra Credit	1	
3a	10	
3b	10	
3c	10	
4	10	
5	10	
6	10	
7	10	
8	10	
%	100	

NAME: _____

SSN: _____

please check the box of your section below

Section 001 (MW 9:05 pm)

or

Section 002 (MW 10:10 pm)

INSTRUCTIONS:

- (1) To receive credit you must:
 - (a) work in a logical fashion, show all your work, indicate your reasoning;
no credit will be given for an answer that *just appears*;
such explanations help with partial credit
 - (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.
- (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 Anton, Bivens, Davis 8th ed.):
Section 7.1 – 7.4, 7.6, 7.7, 8.1 .

Problem Inspiration:

1. Math 141 HANDOUT
2. homework problem § 7.1 # 15 and 17 , actually problem § 7.1 # 12
3. homework problems from § 7.2 and 7.3 , homework problem § Ch. 7 Review # 6.
4. homework problem § 7.4 # 28a and 30
5. homework problem § 8.1 # 5
6. homework problem § 8.1 # 25
7. homework problem § 8.1 # 19 and a Prof. Girardi quiz
8. the *ice-cream cone* example from class

1. Fill in the blanks (each worth 1 point).

1a. $\int \frac{du}{u} = \underline{\hspace{2cm}} |u| + C$

1b. If a is a constant and $a > 0$ but $a \neq 1$, then

$\int a^u du = \underline{\hspace{15cm}} + C$

1c. $\int \sec^2 u du = \underline{\hspace{15cm}} + C$

1d. $\int \sec u \tan u du = \underline{\hspace{15cm}} + C$

1e. $\int \sin u du = \underline{\hspace{15cm}} + C$

1f. $\int \cot u du = \underline{\hspace{15cm}} + C$

1g. $\int \sec u du = \underline{\hspace{15cm}} + C$

1h. If a is a constant and $a > 0$ then

$\int \frac{1}{\sqrt{a^2 - u^2}} du = \underline{\hspace{15cm}} + C$

1i. If a is a constant and $a > 0$ then

$\int \frac{1}{a^2 + u^2} du = \underline{\hspace{15cm}} + C$

1j. The integral of $y = f(x)$ with respect to x is denoted by $\int f(x) dx$.

The integral of $x = g(y)$ with respect to y is denoted by $\underline{\hspace{15cm}}$.

2. Let R be the region enclosed by

$$y = x^2 \quad \text{and} \quad y = x + 2.$$

Let A be the area of the region R .

2a. The points of intersection of $y = x^2$ and $y = x + 2$ are $P = (\underline{\quad}, \underline{\quad})$ and $Q = (\underline{\quad}, \underline{\quad})$.
Make a rough sketch of the region R , labeling P and Q .

2b. Express the area A as integral(s) with respect to x (so you want dx).

You do NOT have to evaluate the integral(s) nor do lots of algebra.

A =

2c. Express the area A as integral(s) with respect to y (so you want dy).

You do NOT have to evaluate the integral(s) nor do lots of algebra.

A =

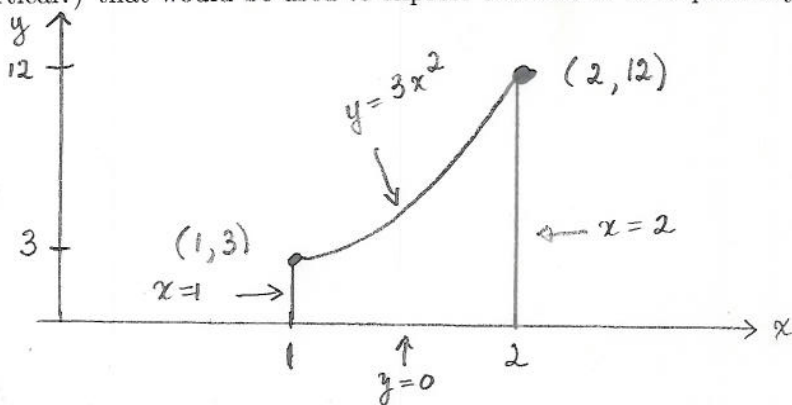
3. Sketched below is the region R that is enclosed by

$$y = 3x^2 \quad \text{and} \quad y = 0 \quad \text{and} \quad x = 1 \quad \text{and} \quad x = 2.$$

In each of problems **3a**, **3b**, **3c**:

- R will be revolved around some line to create a solid of revolution
- using either the disk, washer, or shell method, express the volume V of the resulting solid of revolution as one integral (and NOT as 2 or more integrals).
- In the space provided **below** each problem, make some *good enough sketch* (does not have to be too fancy) to indicate (i.e., help justify) your thinking/reasoning behind your solution
- you do not have to do lots of algebra to your integrand
- you do not have to integrate your integral.

Extra Credit/Hint In the sketch below, draw in a typical rectangle (should it be horizontal or vertical?) that would be used to express the area of R as precisely 1 integral (and not 2 integrals).



3a. The volume V of the solid obtained by revolving the region R about the x -axis is

$V =$

3b. The volume V of the solid obtained by revolving the region R about the y -axis is

$V =$

3c. The volume V of the solid obtained by revolving the region R about the line $y = -1$ is

$V =$

4. Express the arclength of the parameterized curve

$$x(t) = t^3$$

$$y(t) = 5t$$

from the point $P = (1, 5)$ to the point $Q = (8, 10)$ as an integral with respect to t

arclength =

Once again, you do not have to do lots of algebra to your integrand nor integrate your integral.

5.

$$\int \frac{\sin(3x)}{17 + \cos(3x)} dx =$$

Remark: box your substitution box for more partial credit.

Recall: you can check your answer via differentiation (if you have time).

6.

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

Remark: box your substitution box for more partial credit.

Recall: you can check your answer via differentiation (if you have time).

7.

$$\int x^3 17^{(x^4)} dx =$$

Remark: box your substitution box for more partial credit.

Recall: you can check your answer via differentiation (if you have time).

