

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

NAME (printed): _____

SIGNATURE: _____

please check the box of your section below

Section 005 (W&F 8:00 am)

or

Section 006 (W&F 9:05 am)

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, Spring 2006 Exam 1 # 1
2. homework problems from § 7.1, , actually problem § 7.1 # 34
3. homework problems from § 7.2 and 7.3 , homework problem § Ch. 7 Review # 6, Spring 2006 Exam 1 # 3, and examples from the lectures over § 7.2 & § 7.3
4. homework problem § 7.4 # 9 & 11 and Spring 2006 Exam 1 # 4
5. homework problem § 8.1 # 6
6. homework problem § 8.1 # 6
7. homework problem § 8.1 # 11
8. homework problem § 8.1 # 15

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

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

1b. $\int e^u du = \underline{\hspace{4cm}} + C$

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

$\int a^u du = \underline{\hspace{4cm}} + C$

1d. $\int \cos u du = \underline{\hspace{4cm}} + C$

1e. $\int \tan u du = \underline{\hspace{4cm}} + C$

1f. $\int \sec u du = \underline{\hspace{4cm}} + C$

1g. $\int \sec^2 u du = \underline{\hspace{4cm}} + C$

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

$\int \frac{1}{\sqrt{a^2-u^2}} du = \underline{\hspace{4cm}} + C$

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

$\int \frac{1}{a^2+u^2} du = \underline{\hspace{4cm}} + C$

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 $\underline{\hspace{4cm}}$.

2. Let R be the region between by the curve

$$y = \sin x$$

and the line segment joining the points

$$P = (0 , 0) \quad \text{and} \quad Q = \left(\frac{5\pi}{6} , \frac{1}{2} \right) .$$

Let A be the area of the region R .

2a. Make a rough sketch of the region R , labeling P and Q .

The equation of the line through points P and Q is: _____ .

2b. Express the area A as **ONE** integral (but **not** 2 or more integrals).

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

$A =$

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

$$x = 0 \quad \text{and} \quad y = 4 \quad \text{and} \quad y = 9 \quad \text{and} \quad y = x^2 .$$

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

- 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).

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 x -axis is

$V =$

3d. The volume V of the solid obtained by revolving the region R about the vertical line $x = 5$ is

$V =$

4. Express the arclength of the parameterized curve

$$x(t) = t^2 + 4$$

$$y(t) = t + 5$$

from the point

$$P = (4 , 5)$$

to the point

$$Q = (13 , 8)$$

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.

$$\int \frac{1}{9 + 25x^2} dx =$$

Remark: box your substitution box for more partial credit.

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

6.

$$\int \frac{x}{9 + 25x^2} dx =$$

Remark: box your substitution box for more partial credit.

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

7.

$$\int \cos^{17}(7x) \sin(7x) dx =$$

Remark: box your substitution box for more partial credit.

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

8.

$$\int \frac{e^{\sqrt{3x-1}}}{\sqrt{3x-1}} dx =$$

Remark: box your substitution box for more partial credit.

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