

Your Name

Your Signature

Start Time

End Time

Problem	Total Points	Score
1	11	
2	10	
3	10	
4	5	
5	10	
6	9	
7	13	
8	12	
9	10	
10	10	
Extra Credit	(10)	
Total	100	
Percent	100 %	

- This test is closed note and closed book, with the exception of a single side of a single  $3 \times 5$  inch handwritten note card. You must submit your note card with your exam.
- You are not allowed to use a calculator. You are not allowed to share notes.
- In order to receive full credit, you must **show your work** and **justify your answers**. Be wary of doing computations in your head. Instead, write out your computations on the exam paper.
- **PLACE A BOX AROUND** **YOUR FINAL ANSWER** **to each question** *where appropriate*. (Don't bother where it doesn't add clarity to your work.)
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.

- 1 (11 points) Draw and find the area of the region bounded by the curves  $y = \frac{1}{x}$ ,  $y = x^2$  and  $x = e$ .

- 2 (10 points) Set up **but do not evaluate** an integral to find the volume of the solid obtained by rotating the region bounded by the curves  $x = 1 + y^2$  and  $y = x - 3$  about the  $y$ -axis using the method of discs or washers. Draw the region, mark the axis of revolution and a sample disc or washer.

- 3 (10 points) Set up, **but do not evaluate**, an integral for the volume of the solid obtained by rotating the region bounded by the curves  $y = \sqrt{x}$ ,  $y = x^2$  about the axis  $y = 2$  using the method of cylindrical shells. Draw the region, axis of revolution and a sample shell.

- 4 (5 points) Is the method of washers or the method of cylindrical shells better for finding the volume of the solid obtained by rotating the region bounded by the curves  $y = -x^2 + 6x - 8$  and  $y = x - 4$  about the axis  $x = -1$ ? Justify your answer.

- 5 (10 points) When a particle is located a distance  $x$  meters from the origin, a force of  $\sin(\pi x/4)$  newtons acts on it. How much work is done in moving the particle from  $x = 1$  to  $x = 2$ ?

- 6 (9 points) Find the average value of the function  $f(t) = e^{\cos t} \sin t$  on the interval  $[0, \pi/2]$ .

7 (13 points) Evaluate following integrals **using integration by parts**.

(a)  $\int x \sin x \, dx$

(b)  $\int e^{-\theta} \sin \theta \, d\theta$

8 (12 points) Evaluate the following trigonometric integrals.

(a)  $\int \tan^2 \theta \sec^4 \theta \, d\theta$

(b)  $\int \sin^2(x) \sin(2x) \, dx.$

9 (10 points) Evaluate the following integral **using trigonometric substitution**.

$$\int \frac{x^2}{(4-x^2)^{3/2}} dx$$

10 (10 points) Evaluate the following integral **using the method of partial fractions**.

$$\int_0^1 \frac{x-1}{x^2-4x-5} dx$$



11 (Extra Credit: 10 points)      Evaluate the following integrals.

(a)  $\int \frac{\sec \theta \tan \theta}{\sec^2 \theta - \sec \theta} d\theta$

(b)  $\int \arcsin x \, dx$