

Your Name

Your Signature

Start Time

End Time

Problem	Total Points	Score
1	12	
2	10	
3	13	
4	6	
5	10	
6	11	
7	12	
8	14	
9	12	
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 3×5 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.
- Where *appropriate*, **PLACE A BOX AROUND** **YOUR FINAL ANSWER** to each **question**. (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 (12 points) Evaluate the integrals below.

(a) $\int_0^{\pi} t \cos(3t) \, dt$

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

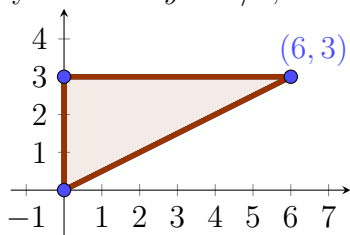
- 2 (10 points) Use Simpson's rule to approximate the integral $\int_1^7 x^2 \ln x \, dx$ with $n = 6$. ***You do not need to evaluate the sum or simplify terms***, but you do need to write out ***explicitly*** all of the terms.

3 (13 points) Evaluate the integral $\int_0^1 \frac{x^2}{\sqrt{1-x^2}} dx$.

- 4 (6 points) Set up, **but do not evaluate** the integral needed to find the length of the curve $y = 1 - e^{-x}$, $0 \leq x \leq 2$.

- 5 (10 points) Set up, **but do not evaluate** the integral needed to find the area of the surface obtained by revolving the curve $y = x^2$ from $x = 0$ to $x = 2$ when revolved about the x -axis.

- 6 (11 points) Find the y coordinate of the centroid for the region shown below. It is bounded by the lines $y = x/2$, $x = 0$, and $y = 3$.



- 7 (12 points) Determine whether the sequence converges or diverges. If it converges, find the limit. Justify your conclusions.

(a) $a_n = \frac{4 + 6n^2}{7 + n}$

(b) $a_n = \frac{\arctan(n)}{n}$

- 8 (14 points) Determine whether the geometric series converges or diverges. If it is convergent, find its sum. Justify your conclusions.

(a) $\sum_{n=1}^{\infty} \frac{\pi^n}{5}$

(b) $\sum_{n=0}^{\infty} \frac{2^{n-1}}{3(5^n)}$

☐ 9 (12 points) Do **one** of the following two problems. **Clearly indicate** which you want graded by checking the appropriate box. I will only grade the problem you indicate!

- (a) (Grade me! ☐) Determine whether the integral $\int_0^\infty \frac{3 - \cos x}{\sqrt{x}} dx$ is convergent or divergent. Justify your conclusion by citing the appropriate theorem(s).

- (b) (Grade me! ☐) Use the Integral Test to determine whether the series $\sum_{n=1}^\infty \frac{1 + \sqrt{n}}{n^3}$ converges or diverges.

- 10 (Extra Credit: 10 points) Consider $s = \sum_{n=1}^{\infty} (2 + e^n)^{-1}$. Estimate the error in using the sum of the first eight terms to approximate the value of s .