

Your Name

Your Signature

Student ID #

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Quiz Section

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Professor's Name

TA's Name

Problem	Total Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Phones off, no earplugs.
- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of handwritten notes (writing on both sides).
- Do not share notes.
- You may use a scientific calculator, but only the Ti-30x IIS Calculator. No other calculator is allowed.
- In order to receive credit, you must show your work. Do not do computations in your head. Instead, write them out on the exam paper. You will not receive credit if you use a trial and error (or guess and check) method when an algebraic method is available.
- Unless you are asked for a decimal answer, give exact answers, simplifying as much as possible.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1. (10 points) A solid is obtained by revolving the region above the x -axis, below the curve $y = e^{-x^2}$, and between the lines $x = 1$ and $x = 5$, about the x -axis.

(a) (3 points) Express the volume of the solid as a definite integral.

(b) (7 points) Approximate the volume using Simpson's rule with $n = 4$. Give your answer to 2 decimal places.

2. (10 points) Evaluate each of the following integrals.

(a) (5 points) $\int \frac{\ln(\tan^{-1} x)}{x^2 + 1} dx$

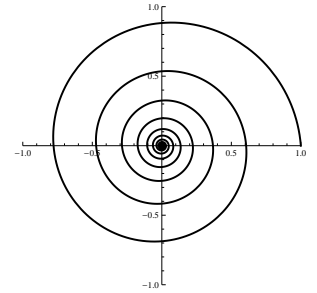
(b) (5 points) $\int_{-\pi/4}^{\pi/4} \cos(2x) \sqrt{4 - \sin^2(2x)} dx$

3. (10 points) Evaluate the integral $\int \frac{2x + 6}{(x - 1)(x^2 + 2x + 5)} dx$.

4. (10 points) The curve in the figure below is given by the parametric equations

$$x(t) = e^{-t} \cos(4\pi t) \quad y(t) = e^{-t} \sin(4\pi t), \quad 0 \leq t < \infty.$$

(a) (6 points) Express the length of the curve as an improper integral. Simplify your answer.



(b) (4 points) Does the integral converge or diverge? If the integral converges, evaluate it; if the integral does not converge, explain why.

5. (10 points) A container in the shape of a cone of height 2 meters and radius 1 meter (see figure) is filled with water. Find the work required to remove the water from the container (in other words, to raise all of the water to the top of the container). Please show your work clearly, give your answer in decimal form to once decimal place, and label it with the correct units. Gravitational acceleration is 9.8 m/sec^2 and the density of water is 1000 kg/m^3 .

