

Your Name

Your Signature

TA's Name

Quiz Section

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- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of handwritten notes (one-sided).
- Graphing calculators are not allowed. Do not share notes.
- In order to receive credit, you must show your work. You can use any of the integrals from the “integral reference table” without justification, all other integrals must be worked out.
- 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 grader where to find your work.
- Raise your hand if you have a question or need more paper. Good luck!

Problem	Total Points	Score
1	9	
2	9	
3	9	
4	10	
5	13	
Total		

Don't open the test until everyone has a copy and the start of the test is announced.

1. [9 points total] Evaluate the following integral:

$$\int \frac{2e^x}{e^{2x} - 3e^x + 2} dx$$

2. [9 points total] Evaluate the following definite integral:

$$\int_0^{\pi/6} \cos^2(3x) \sin^3(3x) dx$$

3. [9 points total] Evaluate the following integral:

$$\int \frac{x^3}{\sqrt{x^2 - 1}} dx$$

4. [10 points total] Consider the region in the first quadrant bounded by the curves $y = \frac{1}{4}x^2$, $x = 0$, and $y = 4$. This region is rotated about the y axis to create a three dimensional solid. Suppose we have a tank with the shape of that solid, oriented so that the y -axis is perpendicular to the ground, the origin is at the bottom of the tank, and units are in meters. If the tank is filled with water, how much work is required to pump all of the water to the top of the tank? (Recall that the mass density of water is 1000 kg/m^3 and the acceleration due to gravity is 9.8 m/sec^2 .)

5. [13 points total] Let \mathcal{R} be the region in the first quadrant bounded by the curves $y = \ln x$, the x -axis and the vertical line $x = 2$ (see picture on the board). Consider the solid of revolution obtained by rotating \mathcal{R} around the x -axis.
- (a) [9 points] Compute the volume of this solid of revolution. Indicate clearly whether you are using washers or shells. Sketch a typical rectangle to be rotated to obtain a washer/shell (depending on the method you are using).
- (b) [4 points] Approximate the volume of the same solid of revolution using trapezoidal rule with $n = 4$. Leave your answer in the sum form.