

Math 125G - Spring 2002
Second Mid-Term Exam
May 21, 2002

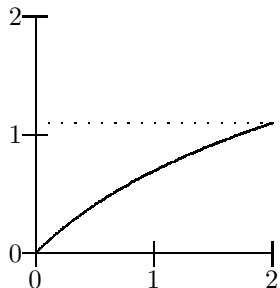
Name _____

Section _____

1	20	
2	10	
3	10	
4	20	
5	20	
6	10	
Total	90	

- Complete all questions.
- You may use a scientific calculator during this examination. Other calculating devices are not allowed.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 80 minutes to complete the exam.

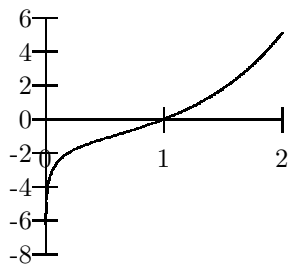
1. (20 points) Consider the region bounded by $y = \ln(x + 1)$, the y -axis, and the line $y = \ln 3$. Suppose we revolve this region about the y -axis to create a solid in three-dimensional space.



- (a) Set up an integral representing the volume of this solid. **Do not evaluate the integral.**
- (b) Suppose this solid is a tank filled with a liquid that weighs 45 lb/ft^3 . If the linear units are feet, set up an integral representing the work done in moving all of the liquid to the top of the tank. **Do not evaluate the integral.**

2. (10 points) Let $0 < p < 1$. Find the average value of the function $x^p(1 - x^{1/p})$ on the interval $[0, 1]$.

3. (10 points) Use Simpson's rule with $n = 4$ to estimate the volume of the solid created by revolving the region bounded by $y = e^x \ln x$, the x -axis, and $x = 2$ about the x -axis. Your answer should be correct to at least 6 digits, so use all the digits you get.



4. (20 points) Evaluate the following integrals.

(a)
$$\int \frac{dx}{x^2 + 4x + 13}$$

(b)
$$\int \frac{dx}{x^2 + 7x + 12}$$

5. (20 points) Evaluate the following integrals.

(a) $\int \frac{x^5}{\sqrt{1+x^2}} dx$

(b) $\int \sin \sqrt{x} dx$

6. (10 points) Evaluate the following integral:

$$\int_0^{\infty} x^2 e^{-x} dx$$