Math 125 B and C   **Midterm 2**   **Palmieri, Autumn 2006**

Your Name   Your Signature

Student ID #

TA's Name and quiz section (circle):

   Cady   Cruz   Jacobs

BA   CB   BB   BC   CA   CC

- Turn off all cell phones, pagers, radios, mp3 players, and other similar devices.

- This exam is closed book. You may use one $8\frac{1}{2}$" $\times$ 11" sheet of handwritten notes (one side).

- Graphing calculators are not allowed.

- Give your answers in exact form, not decimals, except where indicated.

- In order to receive credit, you must **show all of your work**. If you do not indicate the way in which you solved a problem, you may get little or no credit for it, even if your answer is correct. You may use any of the 20 integrals from the table on p. 506 of the text without deriving them. Show your work in evaluating any other integrals, even if they are on your note sheet.

- **Check your work carefully.** We will award only limited partial credit.

- Place $\boxed{\text{a box around your answer}}$ to each question.

- If you need more room, use the backs of the pages and indicate that you have done so.

- Raise your hand if you have a question.

- This exam has 4 pages, plus this cover sheet. Make sure that your exam is complete.

Question	Points	Score
1	16	
2	8	
3	8	
4	8	
5	10	
Total	50	

1. (a) (8 points) Compute $\displaystyle\int \frac{\sin(3t)\cos(3t)}{\cos^2(3t) - 3\cos(3t) + 2}\, dt$.

   (b) (8 points) Compute the average value of $\cos^3(x)$ on the interval $[0, \pi/2]$.

2. (8 points) Compute $\displaystyle\int_{-2}^{2} \frac{1}{\sqrt{x^2 + 4x + 8}}\, dx$.

3. (8 points) Determine if the improper integral $\int_{1}^{\infty} xe^{-3x}\,dx$ converges or diverges. If it converges, evaluate it.

4. (8 points) A spring has natural length of 30 cm (= 0.3 meters). It requires 2 J of work to stretch it from 40 cm to 45 cm. How far beyond its natural length will a force of 64 N keep the spring stretched?

5. A portion of the graph of $y = \ln(x+1)$ between $x = 0$ and $x = e - 1$ is rotated around the y-axis to form a container. The container is filled with water. Distance is measured in meters and the density of water is 1000 kg/m^3.
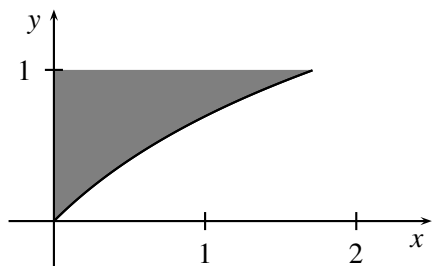
(a) (6 points) Set up, but DO NOT EVALUATE, an integral to compute the work required to pump the water out over the side (which is at height $y = 1$).

(b) (4 points) Use $n = 4$ subdivisions and the midpoint rule to approximate the value of the integral in part (a). Give an answer correct to at least two significant digits.