Math. 301-02
Summer, 2005
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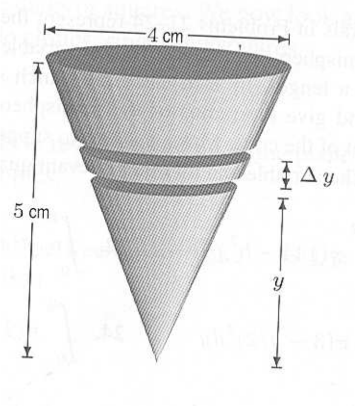
Second Examination
Wednesday, June 29, 2005

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. You may keep this exam sheet. Each entire problem is worth 20 points.

1. State whether the following improper integrals converge or diverge. Give a reason for each of your answers. Evaluate those improper integrals that can be evaluated without resorting to numerical techniques.

$$\text{(a)} \int_{x=1}^{\infty} \frac{dx}{x^{1.001}} \qquad \text{(b)} \int_{x=0}^{1} \frac{dx}{x^{1.001}} \qquad \text{(c)} \int_{x=0}^{\infty} \frac{e^{-x}}{\sqrt{x}} dx$$

2. Find the volume of the following figure by writing down an integral, then evaluating it.



3. Compute the volume of the solid obtained by rotating the portion of the curve $y = \sqrt{x+1}$ between $x = 0$ and $x = 1$ about the line $y = 0$.

4. Compute the length of the portion of the curve $y = x\sqrt{x}$ between $x = 0$ and $x = 1$.

5. Compute the center of mass of an object extending from $x = 0$ meters to $x = 10$ meters, and with density at position x equal to e^{-x} kilograms per meter.