MATH 244, Spring '11
Exam 1

Name:

INSTRUCTIONS: Write legibly. Indicate your answer clearly. Show all work; explain your answers. Answers with work not shown might be worth **zero** points. No calculators, cell phones, or cheating.

Problem	Worth	Score
1	10	
2	15	
3	15	
4	20	
5	20	
6	20	
Total	100	

(10) 1. Evaluate the following integral over $0 \leq x \leq \ln 2$ and $0 \leq y \leq \ln 2$:

$$\int\int e^{x-y}\, dA =$$

(15) 2. Find the volume of the solid that is bounded above by the cylinder $z = x^2$ and below by the region enclosed by the parabola $y = 2 - x^2$ and the line $y = x$ in the xy–plane.

(15) 3. Find the average value of the function $f(x, y) = \sin(x - y)$ over the rectangle $0 \leq x \leq \pi$ and $0 \leq y \leq \pi/2$.

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(20) 4. The region that lies inside the cardoid $r = 1 + \cos\theta$ and outside the circle $r = 1$ is the base of a solid right cylinder. The top of the cyclinder lies in the plane $z = x$.

(a) Express the volume as an integral

(b) Calculate the volume of the cyclinder. (Skip the calculation if you don't have enough time.)

(20) 5. Find the center of mass of a solid of constant density bounded below by the paraboloid $z = x^2 + y^2$ and above by the plane $z = 4$.

(20) 6. Find the average value of the function $f(\rho, \phi, \theta) = \rho$ over the solid ball $\rho \leq 1$.

Think of $f(\rho, \phi, \theta) = \rho$ as density function. Express the moment of inertia about any central axis as an iterated integral.