Math 53 Midterm #2, 4/10/07, 3:40 PM – 5:00 PM
(please do not leave the exam between 4:45 and 5:00)

No calculators or notes are permitted. Each of the 6 questions is worth 10 points. Please write your solution to each of the 6 questions on a separate sheet of paper with your name, SID number, and GSI's name on it. To get full credit, you must put a box around your final answer and show correct work/justification. Good luck!

1. Find the volume of the solid region between the surfaces $z = 2x^2 + 2y^2$ and $z = 12 - x^2 - y^2$.

2. Find the minimum and maximum values of the function

$$f(x, y) = x^2 + y^2 + 5y$$

on the region $x^2+y^2 \leq 4$, and say where the function takes these values.

3. Evaluate the iterated integral

$$\int_0^1 \int_x^1 \frac{\cos y}{y}\, dy\, dx.$$

4. Evaluate the triple integral

$$\iiint_E (x^2 + y^2 + z^2)^{3/2}\, dV,$$

where E is the region determined by the inequalities $x^2 + y^2 + z^2 \leq 1$, $z \geq 0$, and $z^2 \leq x^2 + y^2$.

5. Let R denote the triangle in the x, y plane with corners at $(0, 0)$, $(1, 0)$, and $(0, 1)$. Use the change of variables $x = u^2$, $y = v^2$ to evaluate the double integral

$$\iint_R \frac{1}{\sqrt{xy}}\, dA.$$

6. Evaluate the iterated integral

$$\int_0^{1/\sqrt{2}} \int_x^{\sqrt{1-x^2}} e^{x^2+y^2}\, dy\, dx.$$