Math 550, Exam 2, Spring 2013

Write everything on the blank paper provided. **You should KEEP this piece of paper.** If possible: turn the problems in order (use as much paper as necessary), use only one side of each piece of paper, and leave 1 square inch in the upper left hand corner for the staple. If you forget some of these requests, don't worry about it – I will still grade your exam.

The exam is worth 50 points. SHOW your work. $\boxed{CIRCLE}$ your answer. **CHECK** your answer whenever possible.

No Calculators or Cell phones.

The solutions will be posted later today.

1. (10 points) Let D be the region $D = \{(x,y) \mid x^2 + y^2 \leq 1\}$ in the xy-plane. Does
$$\int\int_D \frac{\sin^2(x^2)}{\sqrt{1-x^2-y^2}} dA$$
exist? Explain thoroughly.

2. (10 points) Let T be the region inside an equilateral triangle in the xy-plane. Two of the vertices of T are $(3,0)$ and $(5,0)$. Rotate T about the y-axis. What is the volume of the resulting solid? Explain thoroughly.

3. (10 points) Compute $\int\int_D x dA$, where D is the region in the xy-plane bounded by the line segment joining $(2,3)$ to $(4,4)$, the line segment joining $(4,4)$ to $(5,6)$, the line segment joining $(5,6)$ to $(3,5)$, and the line segment joining $(3,5)$ to $(2,3)$. Explain thoroughly.

4. (10 points) Compute $\int\int_D x^2 dA$, where D is the region in the xy-plane determined by the two conditions $0 \leq x \leq y$ and $x^2 + y^2 \leq 1$. Explain thoroughly.

5. (10 points) Let a, b, c be positive numbers. Find the volume of the region inside $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} \leq 1$. Explain thoroughly.