

**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. *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.