On my honor, I have abided
by the Elon University Honor Code

Name ______________________ Signature ______________________

Exam #3

Math 321-A

Thursday, May 3, 2007

For full credit show all work. When in doubt, explain your reasoning.

Find all integrals numerically; you need not find an exact solution to them. Round answers to the third decimal place. Find all angles in radians.

1. What are the ways in which looking for local extrema for multivariable functions differs from looking for local extrema for a single-variable function?
2. Set up the integral (but do not evaluate) for finding the surface area of the surface $z = \ln(2x+3y)$ where $1 \leq y \leq x$ and $2 \leq x \leq 4$.
3. Use polar coordinates to integrate $5x + 6y$ on the top half of the disk of radius 3 centered at the origin.
4. Find and use the Second Partials Test to sort all critical points of the function $f(x, y) = x^3 - 24xy + y^3$.
5. Find the x-coordinate for the centroid of the region bounded by $y = x^2 + x + 1$ and $y = -2x^2 - 5x + 10$.
6. Find the absolute extrema for $f(x, y) = x^2y$ on the solid rectangle where $-2 \leq x \leq 2$ and $-1 \leq y \leq 1$.
7. Let $f(x, y) = (x + y)/16$ be a probability density function defined where $1 \leq x \leq 3$ and $1 \leq y \leq 3$. Find the probability that $xy \leq 3$.
8. Compute the Riemann sum for $f(x, y) = x^2 + y^3$ where $0 \leq x \leq 6$ and $1 \leq y \leq 5$ by splitting up the domain into four quarters ($m = 2$ and $n = 2$) and evaluating $f(x, y)$ at the upper right-hand points.
9. Find the volume between the xy-plane and the surface $z = xy$ where $1 \leq y \leq 5/x$ and $1 \leq x \leq 5$.
10. Use cylindrical coordinates to integrate $e^{x^2+y^2}$ over the region where $x^2 + y^2 \leq 4$ and $-3 \leq z \leq 5$.