

Math 275-003
April 12, 2006

Exam 3 Name _____

This test consists of 100 points and 5 pages, none of which is intentionally left blank. Take a few seconds right now to be sure you have all the pages. The point value of each question is to the left of the question number. Show all your work in the space provided. If you run out of room for an answer, continue working on the back of the page. Your answers must be justified by your work.

1. A region S is bounded by the graphs of the following functions

$$x - 2y + 8 = 0$$

$$x + 3y + 5 = 0$$

$$x = -2$$

$$x = 4$$

- (10) (a) Sketch the region S .

- (10) (b) Find the moment about the x -axis of the region S . You may assume the density is 1.

2. Assume the double integral

$$\iint_S f(x, y) dA$$

exists and reduces to the iterated integral

$$\int_0^4 \int_{-\sqrt{4-y}}^{(4-y)/2} f(x, y) dx dy$$

(10) (a) Sketch the region S

(10) (b) Reverse the order of integration to express the double integral as an iterated integral with the inside integral being with respect to y .

3. The iterated integral is given by

$$\int_0^1 \int_{x^2}^x \frac{1}{\sqrt{x^2 + y^2}} dy dx$$

(10) (a) Sketch the region of integration.

(10) (b) Change to polar coordinates and evaluate the integral.

4. Consider the following double integral

$$\iint_S (x - y)^2 \sin^2(x + y) \, dA$$

where S is the parallelogram with vertices $(\pi, 0)$, $(2\pi, \pi)$, $(\pi, 2\pi)$, $(0, \pi)$

- (5) (a) Sketch the region S , include in your sketch the equations of the sides.
- (5) (b) Determine a suitable change of variables for the integral and compute the Jacobian of this transformation.
- (10) (c) Evaluate the integral using your change of variables.

5. The triple integral

$$\iiint_E f(x, y, z) dV$$

reduces to the iterated integral

$$\int_0^1 \int_0^{1-x} \int_0^{x+y} f(x, y, z) dz dy dx$$

(10) (a) Sketch the region E .

(10) (b) Express the triple integral as one or more iterated integrals in which the first integration is with respect to y .