Math 53 Homework 8

Due Tuesday 10/25/11 in section

(The problems in parentheses are for extra practice and optional. Only turn in the underlined problems.)

Monday 10/17 – Applications of double integrals

- **Read:** section 15.5.
- Work: 15.4: <u>36</u>; 15.5: (3), <u>8</u>, (11), <u>12</u>, <u>18</u>, (27), <u>28</u>. <u>Problems 1 and 2</u> below.

Wednesday 10/19: Change of variables in double integrals

- **Read:** section 15.9 to the end of p. 1018.
- Work: 15.9: (1), <u>3</u>, (7), <u>11</u>, (13), <u>15</u>, <u>19</u>, (20). <u>Problem 3</u> below.

Friday 10/21: Triple integrals in rectangular coordinates

- **Read:** section 15.6.
- Work: 15.6: (3), <u>9</u>, (11), <u>15</u>, (17), <u>21</u>, (27), <u>33</u>, <u>35</u>.

Problem 1. (The two parts are independent)

a) Show that the average distance of a point in a disk of radius a to the center of the disk is 2a/3.

b) Find the average distance of a point in a disk of radius a to a fixed point on the circumference of the disk. (Hint: place the center of the disk at (a, 0) and the given point on the circumference at the origin).

Problem 2.

a) Find the area of the region R bounded by the curve $r = \sin 2\theta$ in the first quadrant. (Do this as a double integral in polar coordinates.)

b) Find the coordinates (\bar{x}, \bar{y}) of its center of mass (take a uniform density $\rho = 1$). (Hint: it is helpful to rewrite the value of the inner integral as the product of $\sin \theta$ by an expression involving only cosines.)

Problem 3.

Using the coordinate change u = xy, v = y/x, set up and evaluate an iterated integral for the polar moment of inertia (with density $\rho = 1$) of the region bounded by the hyperbola xy = 1, the x-axis, and the two lines x = 1 and x = 2. Choose the order of integration which makes the limits simplest.