Math 53 Homework 8

Due Wednesday 10/30/13 in section

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

Monday 10/21 – Applications of double integrals

- **Read:** section 15.5.
- **Work:** 15.4: 40[1]; 15.5: (3), 10, (11), 12, 18, (27), 28; Problems 1 and 2 below.

Wednesday 10/23: Change of variables in double integrals

- **Read:** section 15.10 to the middle of p. 1046.[2]
- **Work:** 15.10: (1), 3, (7), 15, (17), 19, 23, (24)[3]; Problem 3 below.

Friday 10/25: Triple integrals in rectangular coordinates

- **Read:** section 15.7. [6th ed: section 15.6]
- **Work:** 15.7: (3), (9), 13, 15, (17), 18, (22), (27), 33, 35.[4]

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.

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[1] 6th ed: 15.4: 36

[2] 6th ed: section 15.9 to the end of p. 1018.

[3] 6th ed: 15.9: (1), 3, (7), 11, (13), 15, 19, (20)

[4] 6th ed: 15.6: (3), (9), 11, 15, (17), 18, (21), (27), 33, 35.