

## MATH 202: Homework 9

due Wednesday, November 15

- (1) Let  $D \subset \mathbf{R}^2$  be the region between the square with vertices  $(1, 1), (-1, 1), (-1, -1), (1, -1)$  and the unit disk centered at the origin. Evaluate  $\int_D y^2$ .
- (2) Let  $T$  be the solid tetrahedron with vertices  $(0, 0, 0), (1, 0, 0), (0, 2, 0)$ , and  $(0, 0, 3)$ . Evaluate  $\int_T 1 - z^2$ .
- (3) Consider the iterated integral

$$\int_{x=0}^2 \int_{y=x/2}^{x/2+1} x^5(2y-x)e^{(2y-x)^2}.$$

Sketch the region  $D \subset \mathbf{R}^2$  of integration in the  $xy$ -plane. Then evaluate the integral using the change of variables mapping

$$\begin{aligned} T: D &\longrightarrow \mathbf{R}^2 \\ T(x, y) &= (x, 2y - x). \end{aligned}$$

- (4) Find the volume of the region  $W \subset \mathbf{R}^3$  obtained as the intersection of the cylinder  $x^2 + y^2 \leq 1$  and the ellipsoid  $2(x^2 + y^2) + z^2 \leq 10$ .
- (5) Find the area of the region bounded by the positive  $x$ -axis and the spiral  $r = 3\theta$ ,  $0 \leq \theta \leq 2\pi$ .

Do the following problems from the textbook:

§6.6: 9

§6.7: 1, 2, 3, 5, 6, 9, 10