Math 223

Week 6 Homework due Tuesday, October 5

Sections 12.1, 12.2

Section 12.1, problems 1, 11, 17, 19, 25, 31

Section 12.2, problems 1, 3, 9, 17, 27, 31, 33, 39, 51

Hints for Section 12.2:

9. Sketch D first and decide if you want to represent it as a type I or a type II region.

17. Sketch the region first, and decide if you want to represent it as a type I or a type II region. You will need to find the points of intersection of the two boundary curves (where $x = x^4$).

27. The cylinder $y = 1 - x^2$ in 3 dimensions is the set of all (x, y, z) such that $y = 1 - x^2$ and z is arbitrary. It hits the xy plane in the parabola $y = 1 - x^2$ where $z = 0$, and the entire cylinder is found by lifting this parabola vertically in both directions (above and below the xy plane). The other cylinder has a similar description. The region bounded by these two parabolas in the xy plane can be regarded as the region of integration of the appropriate double integral. Volume is found by cutting this region into rectangles and multiplying the rectangle area (cross-sectional area) by the distance between the two bounding planes (vertical length of rectangular solid). The distance between the plane $z = 2 - x - y$ and the plane $z = 2x + 2y + 10$ is $(2x + 2y + 10) - (2 - x - y) = 3x + 3y + 8$. Now set up the appropriate double integral and evaluate.

51. If you look at the notes for the class on Friday, October 2, you will see that I set up a similar integral to describe the volume of a geometric object. You can evaluate this integral by looking up the formula for the volume of this object (inside flap of textbook).