

## Math 265 Exam 5 Review

Sketch the region or draw a diagram, draw a representative rectangle(s) (or disk or shell or arc or slab of liquid, etc.), set up the definite integral necessary to solve the problem, then solve the problem.

1. Find the area of the region bounded by the graphs of  $x=2-y^2$  and  $y=x$ .
2. Find the volume of the solid generated when the region bounded by the curve  $y=\tan 2x$  and the lines  $y=0$ ,  $x=0$ , and  $x=\pi/6$  is revolved about the  $x$ -axis.
3. Find the volume of the solid generated by revolving about the line  $y=3$  the region bounded by the lines  $y=4-x$ ,  $y=x$ , and  $y=0$ .
4. Answer #3 using another method.
5. A ball of radius  $r$  is cut into two pieces by a horizontal plane  $a$  units above the center of the ball. Determine the volume of the upper piece by using the cylindrical shell method.
6. Find the volume of the solid whose base is the region bounded by the parabola  $y^2=4x$  and the line  $x=1$  in the  $xy$ -plane and each cross section perpendicular to the  $x$ -axis is an equilateral triangle with one edge in the plane.
7. Find the arc length of the curve  $9y^2=4(x-1)^3$  in the first quadrant from  $x=1$  to  $x=4$ .
8. Find the area of the surface generated when the curve  $x=\sqrt{2y-1}$ ,  $5/8 \leq y \leq 1$ , is revolved about the  $y$ -axis.
9. A spring has a natural length of 1 meter. A force of 24 Newtons stretches the spring to a length of 1.8 meters. How much work will it take to stretch the spring 2 m beyond its natural length?
10. Find the work necessary to wind up a vertically hanging cable 100 feet long and weighing 500 pounds.
11. A cylindrical water tank full of water weighing  $62.5 \text{ lb/ft}^3$  is 10 feet high and 4 feet in diameter. Find the work necessary to empty the tank through an outlet 2 feet above the top of the tank.