Section 7.2

The Disk Method: A method used to find the volume of a solid created by revolving a curve around an axis. The volume of the solid created by revolving a representative rectangle around an axis of revolution is $\Delta V = \pi R^2 \Delta x$, where R is the height of the rectangle (and the radius of the disk). To find the volume of the solid, use

$$V = \pi \int_a^b [R(x)]^2\, dx \quad \text{or} \quad \pi \int_c^d [R(y)]^2\, dy$$

The Washer Method: Similar to the disk method, but used for solids that have holes in them. In this case, the representative rectangle is separated from its axis of rotation, so there is an outer and an inner radius, denoted R and r, respectively. To find the volume of a solid of revolution using the washer method, use the formula

$$V = \pi \int_a^b \left([R(x)]^2 - [r(x)]^2\right) dx.$$

1) Find the volume of the football-shaped solid created when the curve $y = -(x-1)^2 + 1$ is revolved around the x-axis. You can graph the curve on your calculator to get a better idea of what the solid will look like.

2) Find the volume of the solid generated when the region bounded by $f(x) = 2x^2$ and $g(x) = 2$ is revolved about the line $y = 2$.

3) Find the volume of the solid created when the region bounded by the curves $f(x) = x^3$ and $g(x) = \sqrt{x}$ is rotated around the x-axis.

4) Find the volume of the solid formed by revolving the region bounded by the graphs of $f(x) = 6 - x^2, y = 0, x = 0$, and $x = 2$ about the y-axis.

5) Find the volume of the solid whose base is the region in the xy-plane bounded by the curves $y = x^4$ and $y = 3 - 2x^2$ whose cross-sections perpendicular to the x-axis are equilateral triangles with one side in the xy-plane. Note that the area of an equilateral triangle with side length s is $A = \frac{\sqrt{3}}{4}s^2$.

6) Use the disk method to verify that the volume of a right circular cone is $\frac{1}{3}\pi r^2 h$, where r is the radius of the base and h is the height.

Homework this section: #2, 5, 9, 10, 14, 18, 23, 28, 32, 34