Section 6.2 Worksheet:

Assigned problems: Exercises pp. 316-320, #1, 3, 5, 7, 17, 18, 19, 29, 34, 55.

1. First things first: what is a **cylinder**, as defined in this section? (You may be surprised!)

2. What is a **cross section**, and how does it relate to a loaf of bread?

3. Volume, like area, is defined as a limit. Thinking very geometrically now, volume is a limit of a sum of what sorts of geometrical objects?

4. In all of these applications (e.g. volume, density), the principal job is to figure out the best little chunks of stuff to add up. We add up little ΔVs, ΔMs, etc., and then pass to the limit: so $\Delta V \to dV$. In the limit we obtain differentials: infinitesimal bits of stuff! In formula 1, p. 309, what is dV?

Notes:

1. I really believe that the hardest thing about volume is simply the fact that the objects are now in three-D, rather than the familiar two-D (which is a lot easier to draw in!). Work very hard to try to conceptualize the three-dimensional objects with which we work in this chapter.

   If you are struggling to understand the central idea of this section, then actually get out a knife and cut up some three-D objects, just to get a hang of cross sections. Slice up a banana and estimate its volume! Apple slicers are great, but slice radially. You may have a slicer in your kitchen that will help.

2. Average values of functions may be calculated with integrals, as we saw when they were initially defined. We replace a curve with a rectangle of the same area, and the height of this rectangle is an average value for the function on that interval. This is encapsulated in the **Mean Value Theorem** for integrals.