Math 146
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Section 6.2: Solids of Revolution

Suppose you are given a region R in the x, y-plane and you **rotate** R around one of the axes, say the x-axis. The result is a **solid** S.

What we want to do is find the **volume** of that solid using calculus. One way to approximate the volume is by (1) "filling up" the region R with rectangles, (2) rotate each rectangle around the x-axis, (3) find the volume of that results from the rotation of each rectangle, and then (4) sum up the volumes of all the rectangles to approximate the total volume of the solid. Humm, this sounds suspiciously like there is a definite integral involved!!

In each of the problems below, do the following:

- Graph the equations. Pick an appropriate viewing window. Determine the region under consideration.
- Draw a **typical rectangle** inside the region (i.e. imagine "filling" the region up with rectangles).
- Imagine rotating the rectangle around the given axis. **Draw** the result of rotating the rectangle. **Label** with the appropriate labels. Using your labels, **find** the volume of the result of rotating the rectangle.
- Set up and evaluate a **definite integral** that will give the volume of the solid obtained by rotating the region about the given axis.

1. Region bounded by $y = \sqrt{x}$, the x-axis, and the line $x = 1$. Rotate about the x-axis.

2. Region bounded by $x^2 = y - 2$, $2y - x - 2 = 0$, $x = 0$, and $x = 1$. Rotate about the x-axis.

3. Region bounded by $y = x^3$ and the lines $y = 1$, $y = 8$ and $x = 0$. Rotate about the y-axis.

4. Region bounded by $8y = x^3$ and $y = 2x$. Rotate about the y-axis.