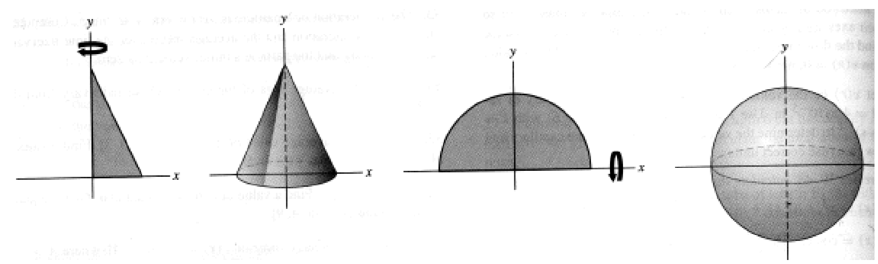
Volumes of Revolution
AP Calculus

We've discovered that we can use integral calculus to find areas between curves and volumes of solids with known cross-sections. We can also use calculus to find volumes of three-dimensional solids called "solids of revolution"!

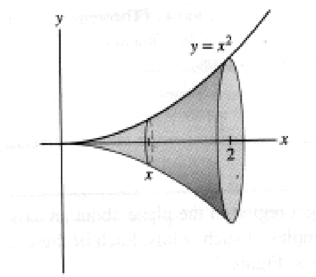
Solids of revolution are basically solids that are created by rotating (or revolving) a region in the plane about an axis.

A right circular cone is an example of a solid of revolution as is a sphere. See below.



You can create all sorts of fun solids by rotating an area between curves over an axis or another line.

Here's an example of a solid created by rotating the region under $y = x^2$ about the x-axis for $0 \le x \le 2$



__Your mission:__
Draw a sketch of each curve described below. Then make a sketch of what the 3-D solid would look like after the region is rotated over the given axis or line. As you do this, think about how you might be able to find the volumes of these solids.

1) The area contained by $y = x^2$ and the y-axis for $0 \le y \le 4$ rotated over the y-axis
2) The area contained by $y = x + 2$ and the x-axis for $0 \le x \le 4$ rotated over the x-axis
3) The area contained by $y = \sqrt{x}$ and the x-axis for $0 \le x \le 9$ rotated over the x-axis
4) The area contained by $y = \sqrt{x}$ and the x-axis for $0 \le x \le 9$ rotated over the line $y = -2$