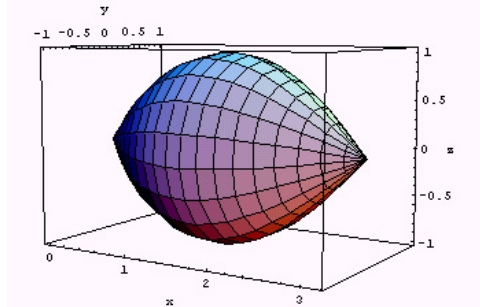# Math 152 Calculus and Analytic Geometry II

Sec 6.2 Volumes

We can use definite integrals to find volumes of three dimentional solids by breaking them in to many slices (or disks or washers)

Definition of Volume: Let S be a solid that lies between x=a and x=b. If the cross-sectional area (perpendicular to the x-axis) is A(x) (a continuous function) then the Volume of S is

$$V = \underset{n \to \infty}{Lim} \sum_{i=1}^{n} A(x_i)\Delta x = \int_{a}^{b} A(x)dx$$

Find the volume of a sphere of radius r

Solids of Revolution:

Consider the region bounded by y=f(x), the line y=0 and x=a and x=b

Make a 3-D solid by rotating that region around the x-axis.

How can you find the volume of that?

http://higheredbcs.wiley.com/legacy/college/anton/0470183454/applets/ch6/figure6_2_13/washer_ex4.htm

http://www.slu.edu/classes/maymk/banchoff/VolumeOfRevolution.html

Consider the region bounded by $y = \sqrt{x}$ and the x-axis from 0 to 4

Find the volume of the solid obtained by rotating the region about the x-axis.

3

Consider the region bounded by $y = \sqrt{x}$ and the x-axis from 0 to 4

Find the volume of the solid rotated about the line y=2

Consider the region bounded by:

$$y = \sqrt{x} \quad \text{and} \quad y = x$$

Find the Integral for the Volume when it is rotated around the y-axis.

Find the Integral for the Volume when it is rotated around the x-axis.

Consider the region bounded by:

$$y = \sqrt{x} \quad \text{and} \quad y = x$$

Find the Integral for the Volume when it is rotated around the line y=2.

Solids of Revolution

If the cross section is a disk then A(x) = or A(y) =

If the cross-section is a washer, then

Practice Problems

Try the following problems: 1,3,5,7,13,17,21,23,49,51

http://higheredbcs.wiley.com/legacy/college/anton/0470183454/applets/ch6/figure6_3_7/shell.htm