Calculus Section 7.4 Arc Length and Surfaces of Revolution  
-Find the length of an arc  
-Find the area of a surface of revolution

Homework: page 473 #’s 3, 11, 13, 21, 38, 43, 44, 47

**Arc Length**  
The length of a curve is found by summing small segments using distance formula.

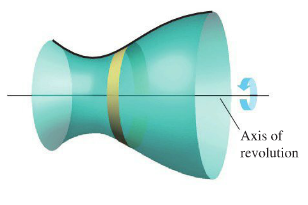
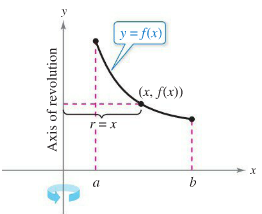
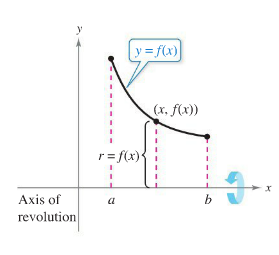
(x0, y0)

(x1, y1)

∆x

∆y

**Examples)**  
Find the arc length of f(x) = x2 on the interval [-1, 1]. Find the arc length of y = on the interval [1, 8].

**Surface of Revolution**We can combine the concepts of volume by rotation and arc length   
to find the surface area of a solid of revolution.

Horizontal axis of rotation Vertical axis of rotation

where r(x) and r(y) are perpendicular to the axis of revolution.

**Example)**  
Find the area of the surface of revolution formed by revolving the graph of f(x) = x3 on the interval [0, 1] about the x-axis.

**Example)**Find the area of the surface formed by revolving the graph of f(x) = x2 on the interval [0, ] about the y-axis.

**Gabriel’s Horn**  
Gabriel’s Horn is the name given to the 3-d figure created when the function on the interval [1, ∞] is revolved about the x-axis. Gabriel’s Horn is a paradox because it has finite volume yet infinite surface area.