# 1   9.4: Surface Area of Revolution

**Goal:** Given a curve, find the area of the surface formed by rotating the curve about a horizontal or vertical axis.

**Method**: Partition the appropriate interval, then approximate the surface using frustrums of cones*

**Area of a Cone Frustrum**:

(See derivation in the text)

**Examples**: Find the area of the surface obtained by rotating the curve $y = \sqrt{r^2 - x^2}$, $x \in [-r, r]$ about the $x$-axis.

*-Why not cylinders? See http://www.math.tamu.edu/~dmanuel/math152/frustrum.pdf for a discussion of this.

Find the area of the surface obtained by rotating the graph of $y = \dfrac{x^2}{2}$, $0 \leq x \leq 1$, about the $y$-axis.

**Method I**:                                                   **Method II**:                              .

The circle $x = \cos t$, $y = 1 + \sin t$ is rotated about the $x$-axis. Find the area of the resulting surface.

**On Beyond Average:**

(NOTE CHANGE): Find the area of the surface obtained by rotating the curve $y = \dfrac{x^4}{8} + \dfrac{1}{4x^2}$, $x \in [1, 2]$ about the $y$-axis.