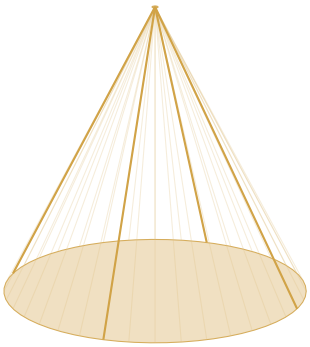
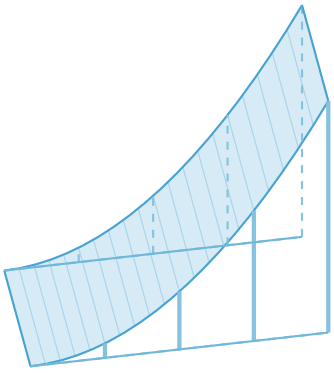
SECTION 2.2: VOLUMES BY SLICING

Start by showing students the cross-section demonstration and the volume by rotation demonstration.

- A Solid Defined by Cross-Sections
- Solids Defined by Rotation

1. Translating our Calculus I calculations of Area to Volumes.





Skate Park Ramp

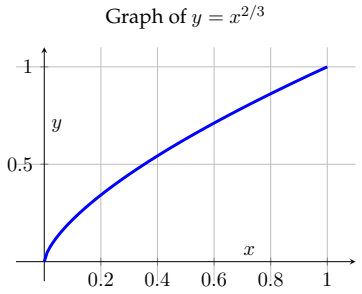
2. A general formula for volume using slices:

3. Sketch the region R bounded by $y = \sqrt{x}$, $y = 0$, and $x = 4$. Determine the volume of the solid with cross-sections perpendicular to the base and parallel to the y-axis are squares.

4. Sketch the same region as in problem 1 above (i.e. the region R bounded by $y = \sqrt{x}$, $y = 0$, and $x = 4$). Find the volume of the solid obtained by rotating this region about the x-axis. Attempt to describe and/or draw what this solid looks like.

5. The Disk Method

6. On the axes below, sketch and shade the region bounded by $y = x^{2/3}$, $x = 0$ and $y = 1$. Then below, sketch the solid obtained by rotating this region about the y-axis. **Set up** an integral to calculate the volume of the solid. Include your sample slice. Evaluate this integral once your have completed the rest of the sheet.



7. Sketch, label, and shade the region bounded by $y = \sqrt{x}$ and $y = x^2$. In another place, sketch the solid obtained by rotating this region about the x-axis. **Set up** an integral to calculate the volume of the solid. Include your sample slice. Evaluate this integral once your have completed the rest of the sheet.

8. The Washer Method

9. Find the volume of the solid obtained by rotating about the y axis the region bounded by $y = x^2$ and $y = 4x$. (Sketch the region. Draw a slice.)