

6.2 Part I: Volumes By Cross Sections

Definition

The volume of a bounded solid with similar cross sections of area $A(x)$ is given by

$$V = \int_a^b A(x) dx$$

💡 **Example 1** A solid has a base bounded by $y = \sqrt{x}$, the x -axis, and $x = 4$. Cross sections perpendicular to the x -axis are squares. Find the volume.

💡 **Example 2** A solid has a base bounded by $y = x$ and $y = x^2$. Cross sections perpendicular to the y -axis are semi-circles. Find the volume.

**Example 3**

Two quarter round pieces of molding with radius 3 cm intersect at a right angle. Find the volume of intersection.

Example 4

A solid is bounded in the first quadrant by $y = \sin(x)$ and $y = 1$ for $0 \leq x \leq \frac{\pi}{2}$. Cross sections perpendicular to the x -axis are equilateral triangles. Set up the integral and use your calculator to approximate the volume.