Volume Using Cross Sections

A cross section is the **shape** we get when cutting straight through an object, a view into the **inside** made by cutting through the object.

Examples:

Tree	Bread	I-Beam

Visualizing Volume using the Area of a Cross Section

Example:

- Sketch the area between the graphs of
  $y = -\frac{1}{12}x^3 + \frac{1}{6}x^2 + \frac{11}{12}x - 1$ and
  $y = \frac{1}{12}x^3 - \frac{1}{6}x^2 - \frac{11}{12}x + 1$ on the interval $[1,4]$.

- Use this area as the base of a 3-dimensional solid where the cross sections are semi-circles.

- Sketch a 3-D image of this solid.

Finding the Volume using the Area of a Cross Section

Example:

Let R be the region bounded by the graphs of
$y = -\frac{1}{12}x^3 + \frac{1}{6}x^2 + \frac{11}{12}x - 1$ and
$y = \frac{1}{12}x^3 - \frac{1}{6}x^2 - \frac{11}{12}x + 1$ on the interval $[1,4]$.
Find the volume of the solid that has R as its base if every cross section by a plane perpendicular to the x-axis are semi-circles.

Volume Using Cross Sections:

① Identify the shape of the cross section

② Find the area of that cross section

③ Sum up the total # of cross sections
   to get the volume