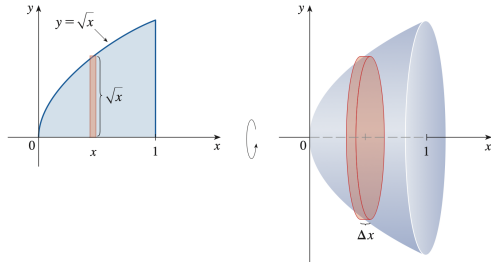


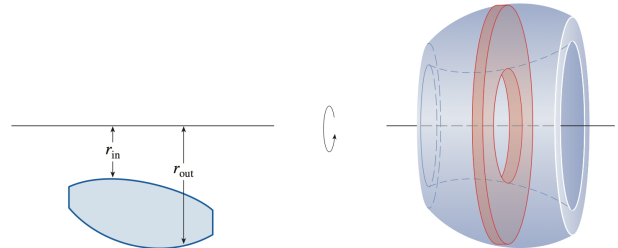
Mixed Practice: Disks, Washers, and Shells

There are three primary slicing methods used to compute the volume of a solid of revolution:

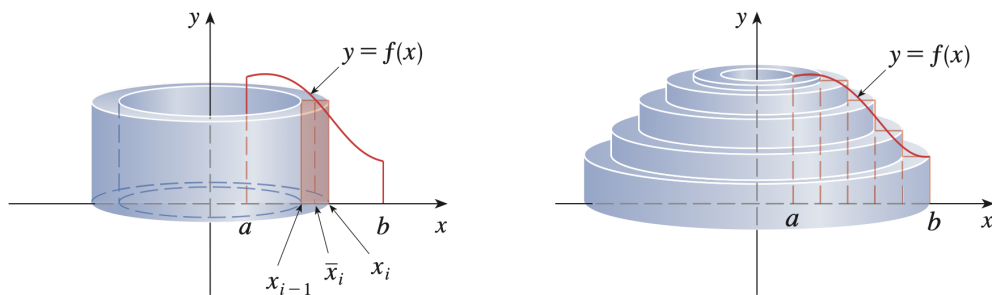
Disk Method: Slices are drawn perpendicular to the axis of rotation. If there is no gap between the region and the axis, each slice is disk.



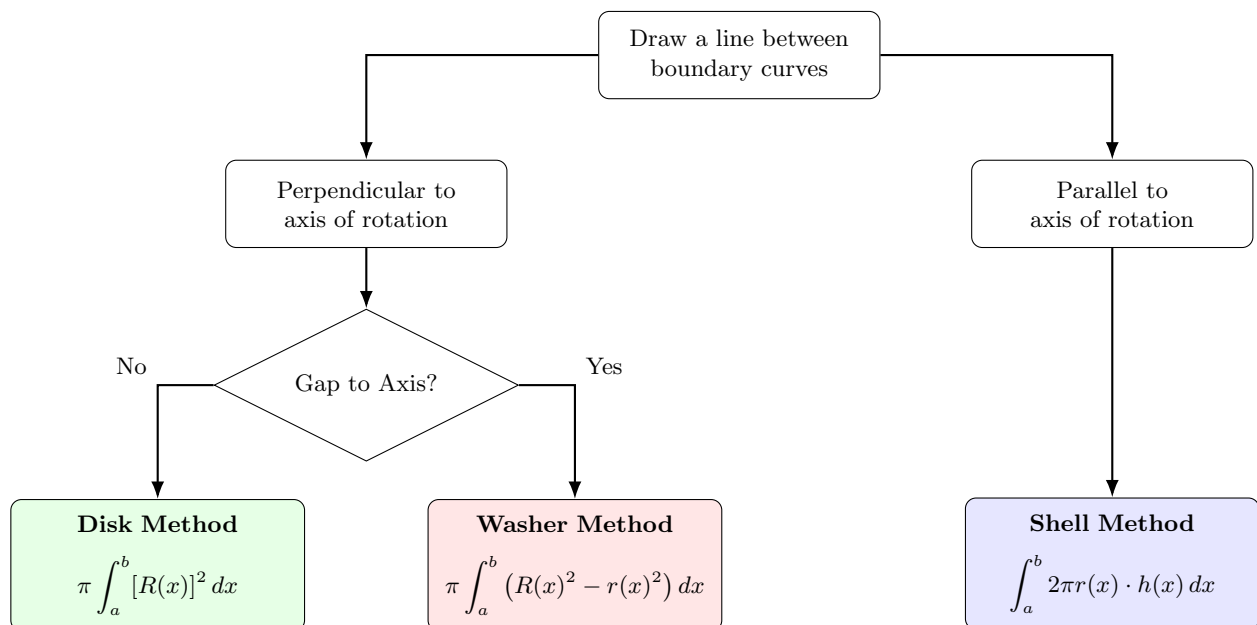
Washer Method: Slices are drawn perpendicular to the axis of rotation. If there is a gap between the region and the axis, each slice is washer.



Shell Method: Slices are drawn parallel to the axis of rotation. Each slice forms a cylindrical shell, and its volume is determined by its radius, height, and thickness.



This flowchart helps you choose the correct setup for a volume of revolution problem.



Problem 1. Find the volume of the solid obtained by rotating the region bounded by

$$y = \sqrt{x}, \quad y = 0, \quad x = 4$$

about the line $y = 0$.

Problem 2. Find the volume of the solid obtained by rotating the region bounded by

$$x = \sqrt{y}, \quad x = 0, \quad y = 9$$

about the line $x = 0$.

Problem 3. Find the volume of the solid obtained by rotating the region bounded by

$$y = \sqrt{x} + 1, \quad y = 3, \quad x = 0$$

about the line $y = -1$.

Problem 4. Find the volume of the solid obtained by rotating the region bounded by

$$x = y^2 + 1 \quad \text{and} \quad x = 5$$

about the line $x = -1$.

Problem 5. Find the volume of the solid obtained by rotating the region bounded by

$$y = 4 - x^2 \quad \text{and} \quad y = 0$$

about the line $x = 3$.

Problem 6. Find the volume of the solid obtained by rotating the region bounded by

$$x = \sqrt{y}, \quad x = 3, \quad y = 0$$

about the line $y = -1$.

Problem 7. Find the volume of the solid obtained by rotating the region bounded by

$$y = x^2 \quad \text{and} \quad y = 2x$$

about the line $y = 0$.

Problem 8. Find the volume of the solid obtained by rotating the region bounded by

$$y = x \quad \text{and} \quad y = \sqrt{x}$$

about the line $y = 2$.

Problem 9. Find the volume of the solid obtained by rotating the region bounded by

$$x = y^2, \quad x = 2 - y, \quad y = 0$$

about the line $x = 0$.

Problem 10. Find the volume of the solid obtained by rotating the region bounded by

$$y = \frac{1}{x}, \quad y = 0, \quad x = 1, \quad x = 4$$

about the line $x = 0$.