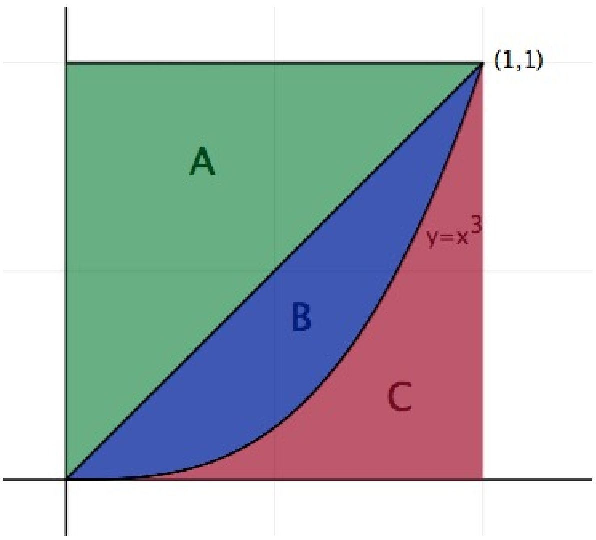
Volumes by Cylindrical Shells: Examples

1. Using the method of cylindrical shells, find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line: $x^2y = 4$, $y = 0$, $x = 1$, $x = 4$; about $x = -3$

2. Let R be the region bounded by $y = \sin x$ and the x-axis for $0 \leq x \leq \pi$. Set up an integral that represents the volume of the solid generated by rotating R about the line $x = 4$.

3. Using the method of cylindrical shells, find the volume generated by rotating the given region about the specified line:



   (a) A about $x = 1$

   (b) B about $y = 1$

   (c) C about $x = 0$

4. Using the method of cylindrical shells, find the volume generated by rotating the region bounded by $y = x^2 - 3x$ and $y = 4$ about the line $x = 5$.

5. Use the method of cylindrical shells to find the volume generated by rotating the region bounded by $x = 1 - y^2$, $y \leq 0$, and $x = -3$ about the line $y = -3$.

6. Set up an integral for the volume of the solid obtained by rotating the region bounded by $x = e^{\sin y}$, $0 \leq y \leq \pi$, and $x = 0$ about the line $y = -1$.

7. Show (using shells) that the volume of a sphere is given by $V = \frac{4}{3}\pi r^3$.

8. Using shells, find the volume of the solid resulting from rotating the region bounded by $x = 0$, $y = x^{1/3}$ and $y = 1$ about the line $y = -1$.

9. Rotate the region in the first quadrant bounded by $y = cos(x^2)$, $y = 0$ and $x = 0$ about the y-axis and calculate the volume.