

Topic 17: Exercises on Volumes and Shells

Level 1

1. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq x^2\}$ about the x -axis.

$$\frac{\pi}{5} \text{ units}^3$$

2. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq x^2\}$ about the y -axis.

$$\frac{\pi}{2} \text{ units}^3$$

3. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq x^2\}$ about the line $x = 1$.

$$\frac{\pi}{6} \text{ units}^3$$

4. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, x^3 \leq y \leq 1\}$ about the x - axis.

$$\frac{6\pi}{7} \text{ units}^3$$

5. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, x^3 \leq y \leq 1\}$ about the y - axis.

$$\frac{3\pi}{5} \text{ units}^3$$

6. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, x^{1/3} \leq y \leq 1\}$ about the x -axis.

$$\frac{2\pi}{5} \text{ units}^3$$

7. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, x^{1/3} \leq y \leq 1\}$ about the line $y = 1$.

$$\frac{\pi}{10} \text{ units}^3$$

8. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 2, 4 - x^2 \leq y \leq 4\}$ about the y -axis.

8π units³

9. By taking strips parallel to the axis of rotation, use the method of cylindrical shells to find the volume of the solid obtained by rotating the region $\{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq \sqrt{x}\}$ about the line $x = 1$.

$$\frac{8\pi}{15} \text{ units}^3$$