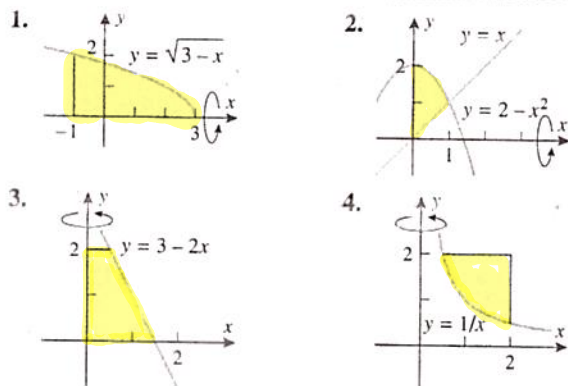


In Exercises 1–4, find the volume of the solid that results when the shaded region is revolved about the indicated axis.



In Exercises 5–14, find the volume of the solid that results when the region enclosed by the given curves is revolved about the x -axis.

5. $y = x^2$, $x = 0$, $x = 2$, $y = 0$
6. $y = \sec x$, $x = \pi/4$, $x = \pi/3$, $y = 0$
7. $y = \sqrt{\cos x}$, $x = \pi/4$, $x = \pi/2$, $y = 0$
8. $y = x^2$, $y = x^3$
9. $y = \sqrt{25 - x^2}$, $y = 3$
10. $y = 9 - x^2$, $y = 0$
11. $y = e^x$, $y = 0$, $x = 0$, $x = \ln 3$
12. $y = e^{-2x}$, $y = 0$, $x = 0$, $x = 1$
13. $x = \sqrt{y}$, $x = y/4$
14. $y = \sin x$, $y = \cos x$, $x = 0$, $x = \pi/4$. [Hint: Use the identity $\cos 2x = \cos^2 x - \sin^2 x$.]

In Exercises 15–22, find the volume of the solid that results when the region enclosed by the given curves is revolved about the y -axis.

15. $y = x^3$, $x = 0$, $y = 1$
16. $x = 1 - y^2$, $x = 0$
17. $x = \sqrt{1 + y}$, $x = 0$, $y = 3$
18. $y = x^2 - 1$, $x = 2$, $y = 0$
19. $x = \csc y$, $y = \pi/4$, $y = 3\pi/4$, $x = 0$
20. $y = x^2$, $x = y^2$
21. $x = y^2$, $x = y + 2$
22. $x = 1 - y^2$, $x = 2 + y^2$, $y = -1$, $y = 1$
23. Find the volume of the solid that results when the region above the x -axis and below the ellipse

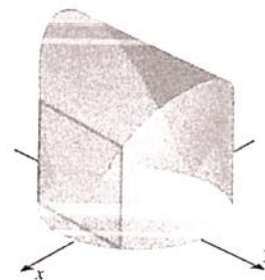
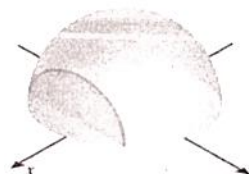
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \quad (a > 0, b > 0)$$

is revolved about the x -axis.

24. Let V be the volume of the solid that results when the region enclosed by $y = 1/x$, $y = 0$, $x = 2$, and $x = b$ ($0 < b < 2$) is revolved about the x -axis. Find the value of b for which $V = 3$.
25. Find the volume of the solid generated when the region enclosed by $y = \sqrt{x+1}$, $y = \sqrt{2x}$, and $y = 0$ is revolved about the x -axis. [Hint: Split the solid into two parts.]
26. Find the volume of the solid generated when the region enclosed by $y = \sqrt{x}$, $y = 6 - x$, and $y = 0$ is revolved about the x -axis. [Hint: Split the solid into two parts.]
27. Find the volume of the solid that results when the region enclosed by $y = \sqrt{x}$, $y = 0$, and $x = 9$ is revolved about the line $x = 9$.
28. Find the volume of the solid that results when the region in Exercise 27 is revolved about the line $y = 3$.
29. Find the volume of the solid that results when the region enclosed by $x = y^2$ and $x = y$ is revolved about the line $y = -1$.
30. Find the volume of the solid that results when the region in Exercise 29 is revolved about the line $x = -1$.
31. A nose cone for a space reentry vehicle is designed so that a cross section, taken x ft from the tip and perpendicular to the axis of symmetry, is a circle of radius $\frac{1}{4}x^2$ ft. Find the volume of the nose cone given that its length is 20 ft.
32. A certain solid is 1 ft high, and a horizontal cross section taken x ft above the bottom of the solid is an annulus of inner radius x^2 and outer radius \sqrt{x} . Find the volume of the solid.
33. Find the volume of the solid whose base is the region bounded between the curves $y = x$ and $y = x^2$, and whose cross sections perpendicular to the x -axis are squares.
34. The base of a certain solid is the region enclosed by $y = \sqrt{x}$, $y = 0$, and $x = 4$. Every cross section perpendicular to the x -axis is a semicircle with its diameter across the base. Find the volume of the solid.
35. Find the volume of the solid whose base is enclosed by the circle $x^2 + y^2 = 1$ and whose cross sections taken perpendicular to the base are

(a) semicircles

(b) squares



(c) equilateral triangles.

