

more volumes of rotation!

In Exercises 1–18, sketch the region bounded by the graphs of the given equations and determine the area of the region.

1. $y = \frac{1}{x^2}$, $y = 0$, $x = 1$, $x = 5$
2. $y = \frac{1}{x^2}$, $y = 4$, $x = 5$
3. $y = \frac{1}{x^2 + 1}$, $y = 0$, $x = -1$, $x = 1$
4. $y = 1 - \frac{x}{2}$, $y = x - 2$, $y = 1$
5. $x = y^2 - 2y$, $x = 0$
6. $x = y^2 - 2y$, $x = -1$, $y = 0$
7. $y = x$, $y = x^3$
8. $x = y^2 + 1$, $x = y + 3$
9. $y = x^2 - 8x + 3$, $y = 3 + 8x - x^2$
10. $y = x^2 - 4x + 3$, $y = x^3$, $x = 0$
11. $y = \sqrt{x - 1}$, $y = 2$, $y = 0$, $x = 0$
12. $y = \sqrt{x - 1}$, $y = \frac{x - 1}{2}$

13. $\sqrt{x} + \sqrt{y} = 1$, $y = 0$, $x = 0$
14. $y = x^4 - 2x^2$, $y = 2x^2$
15. $y = e^x$, $y = e^2$, $x = 0$
16. $y = \csc x$, $y = 2$ (one region)
17. $y = \sin x$, $y = \cos x$, $\frac{\pi}{4} \leq x \leq \frac{5\pi}{4}$
18. $x = \cos y$, $x = \frac{1}{2}$, $\frac{\pi}{3} \leq y \leq \frac{7\pi}{3}$

In Exercises 19–26, find the volume of the solid generated by revolving the plane region bounded by the given equations about the indicated line.

19. $y = x$, $y = 0$, $x = 4$
 - (a) the x -axis
 - (b) the y -axis
 - (c) the line $x = 4$
 - (d) the line $x = 6$
20. $y = \sqrt{x}$, $y = 2$, $x = 0$
 - (a) the x -axis
 - (b) the line $y = 2$
 - (c) the y -axis
 - (d) the line $x = -1$
21. $\frac{x^2}{16} + \frac{y^2}{9} = 1$
 - (a) the y -axis (oblate spheroid)
 - (b) the x -axis (prolate spheroid)
22. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
 - (a) the y -axis (oblate spheroid)
 - (b) the x -axis (prolate spheroid)
23. $y = \frac{1}{x^4 + 1}$, $y = 0$, $x = 0$, $x = 1$, revolved about the y -axis
24. $y = \frac{1}{\sqrt{1 + x^2}}$, $y = 0$, $x = -1$, $x = 1$, revolved about the x -axis
25. $y = -x^2 + 6x - 5$, $y = 0$
 - (a) the x -axis
 - (b) the y -axis
26. $y = e^{-x}$, $y = 0$, $x = 0$, $x = 1$, revolved about the x -axis