In Exercises 1–14, write an equation for the specified line.

1. through $(1, -6)$ with slope 3

2. through $(-1, 2)$ with slope $-1/2$

3. the vertical line through $(0, -3)$

4. through $(-3, 6)$ and $(1, -2)$

5. the horizontal line through $(0, 2)$

6. through $(3, 3)$ and $(-2, 5)$

7. with slope -3 and y-intercept 3

8. through $(3, 1)$ and parallel to $2x - y = -2$

9. through $(4, -12)$ and parallel to $4x + 3y = 12$

10. through $(-2, -3)$ and perpendicular to $3x - 5y = 1$

11. through $(-1, 2)$ and perpendicular to $\frac{1}{2}x + \frac{1}{3}y = 1$

12. with x-intercept 3 and y-intercept -5

13. the line $y = f(x)$, where f has the following values:

x	-2	2	4
$f(x)$	4	2	1

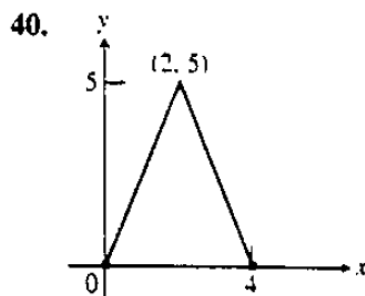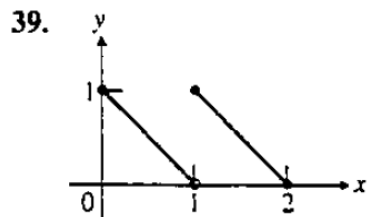14. through $(4, -2)$ with x-intercept -3

In Exercises 15–18, determine whether the graph of the function is symmetric about the y-axis, the origin, or neither.

15. $y = x^{1/5}$

16. $y = x^{2/5}$

17. $y = x^2 - 2x - 1$

18. $y = e^{-x^2}$

19. Find the center and radius of the circle with equation $x^2 + y^2 - 8x - 6y = 0$.

In Exercises 39 and 40, write a piecewise formula for the function.

39.

40.

In Exercises 41 and 42, find

(a) $(f \circ g)(-1)$ (b) $(g \circ f)(2)$

(c) $(f \circ f)(x)$ (d) $(g \circ g)(x)$

41. $f(x) = \dfrac{1}{x}$, $g(x) = \dfrac{1}{\sqrt{x + 2}}$

42. $f(x) = 2 - x$, $g(x) = \sqrt[3]{x + 1}$

In Exercises 43 and 44, (a) write a formula for $f \circ g$ and $g \circ f$ and find the (b) domain and (c) range of each.

43. $f(x) = 2 - x^2$, $g(x) = \sqrt{x + 2}$

44. $f(x) = \sqrt{x}$, $g(x) = \sqrt{1 - x}$

In Exercises 53 and 54,

(a) find f^{-1} and show that $(f \circ f^{-1})(x) = (f^{-1} \circ f)(x) = x$.

(b) graph f and f^{-1} in the same viewing window.

53. $f(x) = 2 - 3x$

54. $f(x) = (x + 2)^2$, $x \geq -2$

57. Find the six trigonometric values of $\theta = \cos^{-1}(3/7)$. Give exact answers.

65. *Guppy Population* The number of guppies in Susan's aquarium doubles every day. There are four guppies initially.

(a) Write the number of guppies as a function of time t.

(b) How many guppies were present after 4 days? after 1 week?

(c) When will there be 2000 guppies?

(d) **Writing to Learn** Give reasons why this might not be a good model for the growth of Susan's guppy population.

21. Write the equation of the line through $(-2, 1)$ which:

(a) goes through $(7, 3)$:
(b) is parallel to $3x - 2y = 5$:
(c) is perpendicular to $3x - 4y = 9$:
(d) is perpendicular to $y = 4$:
(e) has y-intercept 3.

22. Show that $(2, -1), (5, 3)$, and $(11, 11)$ are on the same line.

1. Convert the following to radians (leave π in your answer).

(a) $240°$ (b) $-60°$ (c) -135
(d) 540 (e) 600 (f) 720
(g) 18 (h) 22.5 (i) 6

2. Convert the following radian measures to degrees.

(a) $\dfrac{7\pi}{6}$ (b) $\dfrac{-\pi}{3}$ (c) 8π

(d) $\dfrac{5\pi}{4}$ (e) $\dfrac{3\pi}{2}$ (f) $\dfrac{-11\pi}{12}$

(g) $\dfrac{\pi}{18}$ (h) $\dfrac{-\pi}{4}$ (i) $\dfrac{-\pi}{5}$

5. Calculate (be sure your calculator is in radian mode).

(a) $\sin(0.452)$ (b) $\cos(0.452)$
(c) $\tan(0.452)$ (d) $\sin(-0.361)$
(e) $\cos(-0.361)$ (f) $\tan(-0.361)$

9. Evaluate without use of a calculator.

(a) $\tan\left(\dfrac{\pi}{6}\right)$ (b) $\sec(\pi)$ (c) $\sec\left(\dfrac{3\pi}{4}\right)$

(d) $\csc\left(\dfrac{\pi}{2}\right)$ (e) $\cot\left(\dfrac{\pi}{4}\right)$ (f) $\tan\left(-\dfrac{\pi}{4}\right)$

10. Evaluate without use of a calculator.

(a) $\tan\left(\dfrac{\pi}{3}\right)$ (b) $\sec\left(\dfrac{\pi}{3}\right)$ (c) $\cot\left(\dfrac{\pi}{3}\right)$

(d) $\csc\left(\dfrac{\pi}{4}\right)$ (e) $\tan\left(-\dfrac{\pi}{6}\right)$ (f) $\cos\left(-\dfrac{\pi}{3}\right)$

1) approximate a solution of

$$x^3 + 9x - 3 = 0$$

to within two decimal places.

2) approximate the solutions of

$$x^5 - 7x^4 - 2x^3 + 3x^2 + 7x - 4 = 0$$

to within two decimal places.

12) Are there any asymptotes apparent from the graph? What are they?

Draw the graph of

$$y = \frac{x^2 - 4}{x^2 - 9}$$

13) Draw the graph of

$$y = \frac{x^2 - 4}{x - 1}$$

Determine any horizontal or vertical asymptotes.

14) Draw the graph of

$$y = \frac{x - 3}{x^2 - 1}$$

Determine any asymptotes.

30. Find equations of the lines passing through $(1, 3)$ and having the following characteristics:

(a) Slope of $-\frac{2}{3}$

(b) Perpendicular to the line $x + y = 0$

(c) Passing through the point $(2, 4)$

(d) Parallel to the x-axis

In Exercises 11–14, determine the radius and center of the given circle and sketch its graph.
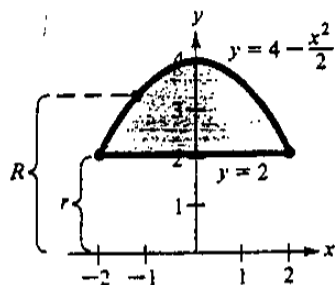
11. $x^2 + y^2 + 6x - 2y + 1 = 0$

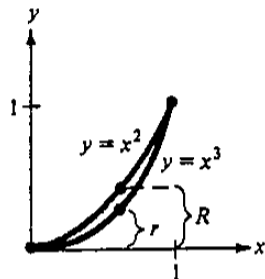**12.** $4x^2 + 4y^2 - 4x + 8y = 11$

13. $x^2 + y^2 + 6x - 2y + 10 = 0$

14. $x^2 - 6x + y^2 + 8y = 0$

In Exercises 41–44, express the indicated values as functions of x.

41. R and r **42.** R and r
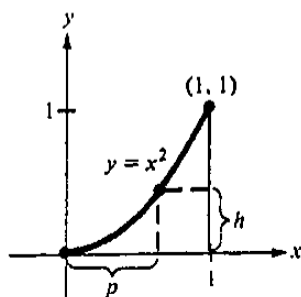
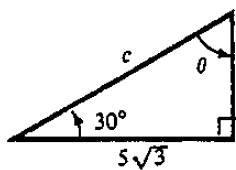**43.** h and p **44.** h and p
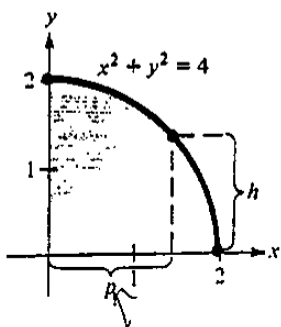
53. Given $f(x) = 1 - x^2$ and $g(x) = 2x + 1$, find

(a) $f(x) + g(x)$ (b) $f(x) - g(x)$

(c) $f(x)g(x)$ (d) $\dfrac{f(x)}{g(x)}$

(e) $f(g(x))$ (f) $g(f(x))$

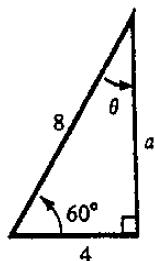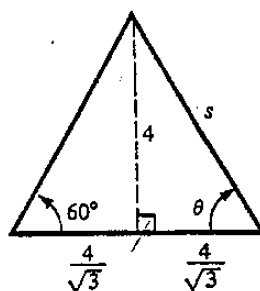In Exercises 63–68, solve the given triangle for the indicated side and/or angle.
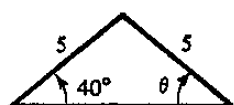
63.

c

$30°$

$5\sqrt{3}$

θ

64.

288

$45°$

a

a

θ

65.

8

$60°$

4

θ

a

66.

4

$60°$

$\dfrac{4}{\sqrt{3}}$

$\dfrac{4}{\sqrt{3}}$

θ

s
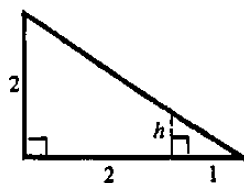
67.

5

5

$40°$

θ

68.

2

2

1

h
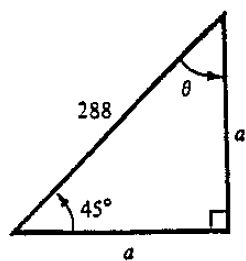
69. A six-foot person standing 12 feet from a streetlight casts an 8-foot shadow as shown in Figure 1.87. What is the height of the streetlight?
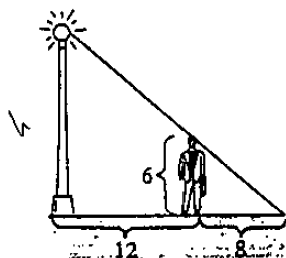
6

12

8

FIGURE 1.87