

Do the following as indicated.

For the given functions f and g , find the requested function.

1) $f(x) = x - 6$; $g(x) = 9x^2$
Find $(f - g)(x)$.

2) $f(x) = 3x^3 + 1$; $g(x) = 5x^2 - 2$
Find $(f \cdot g)(x)$.

3) $f(x) = \sqrt{x}$; $g(x) = 4x - 1$
Find $(\frac{f}{g})(x)$.

4) $f(x) = x + 5$; $g(x) = 7x + 6$
Find $(f + g)(x)$.

5) $f(x) = \sqrt{x + 9}$; $g(x) = 8x - 13$
Find $(g \circ f)(x)$.

6) $f(x) = x^3 + 3x$; $g(x) = -3x$
Find $(f \circ g)(x)$.

Find the inverse of the one-to-one function.

7) $f(x) = 5x + 9$

8) $f(x) = x^3 + 4$

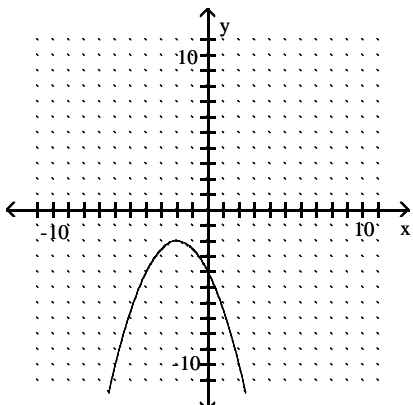
Graph the exponential function.

9) $f(x) = 2^x + 1$

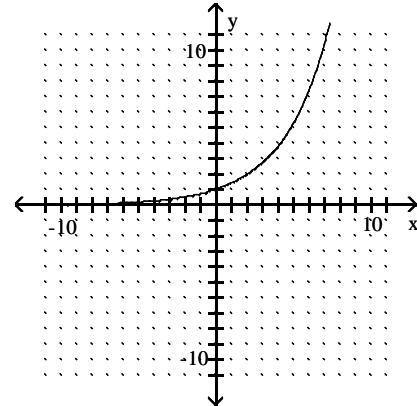
10) $f(x) = 3^x + 1$

Determine whether the graph of the function is the graph of a one-to-one function.

11)



12)



Graph the function and its inverse on the same set of axes.

13) $y = \log_2 x$; $y = 2^x$

Solve for x .

14) $27^x = 9$

15) $2(3x - 5) = 16$

16) $243^{5x - 4} = 81^{2x}$

17) $\log_x 3 = \frac{1}{4}$

18) $\log_3 x = 2$

19) $\log_{10} 1 = x$

20) $\log x = 3.9$ (Give exact answer)

21) $\log 17x = 1.2$ (Round answer to four decimal places.)

22) $\ln x = .7$ (Round answer to four decimal places.)

23) $\ln 5x = 0.5$ (Round answer to four decimal places.)

Find the value of the logarithmic expression.

24) $\log_{10} \frac{1}{1000}$

25) $9^{\log_9 20}$

26) $\log_8 1$

27) $\log_{11} 11$

Write the expression as sums or differences of multiples of logarithms.

28) $\log_4 \frac{x-5}{x^8}$

29) $\log_y \frac{7x}{4}$

Express as the logarithm of a single expression. Assume that variables represent positive numbers.

30) $\log_6 (x-4) - \log_6 (x-1)$

31) $(\log_a x - \log_a y) + 3 \log_a z$

Use a calculator to approximate the logarithm to four decimal places.

32) $\log \sqrt{192}$

33) $\log \frac{3}{\pi}$

34) $\ln \pi^3$

35) $\ln 0.992$

36) $\log_5 2$

37) $\log_{\pi} \sqrt{15}$

Solve the equation. Give an approximate solution to four decimal places.

38) $2^{7x} = 3.7$

39) $3^x + 8 = 6$

40) $e^{(x+2)} = 5$

Solve the equation. Give an exact solution.

41) $3^x + 6 = 4$

42) $e^{2x} = 7$

43) $\log_7 (x^2 - 6x) = 1$

44) $\log_3 x + \log_3 (x-8) = 2$

45) $\log_5 (x+2) - \log_5 x = 2$

46) $\log_2 x^2 = \log_2 (3x+28)$

Solve.

47) Use the formula $R = \log \left(\frac{a}{T} \right) + B$ to find the intensity R on the Richter scale, given that amplitude a is 424 micrometers, time T between waves is 4 seconds, and B is 3. Round answer to one decimal place.

48) The amount of a radioactive substance present, in grams, at time t in months is given by the formula $y = 7000(2)^{-0.2t}$. Find the number of grams present in 2 years. If necessary, round to three decimal places.

49) Calculate how much money Level has after 4 years if he originally invested \$1020 at 6.6% compounded continuously. Use $A = Pe^{rt}$, where A is the final amount, P is the original amount deposited, r is the interest rate, and t is the number of years.

50) The size of the raccoon population at a national park increases at the rate of 4.9% per year. If the size of the current population is 117, find how many raccoons there should be in 8 years. Use $y = y_0 e^{0.049t}$ and round to the nearest whole number.

51) Find out how long it takes a \$2900 investment to earn \$400 interest if it is invested at 9% compounded monthly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$.

67) $25x^2 + y^2 = 25$

68) $\frac{(x+1)^2}{9} + \frac{(y-2)^2}{4} = 1$

Find the distance between the pair of points.

52) (-5, -7) and (1, -3)

69) $\frac{(y+2)^2}{9} - \frac{(x+2)^2}{49} = 1$

Find the midpoint of the line segment whose endpoints are given.

53) $(5\sqrt{3}, -7\sqrt{6}), (8\sqrt{3}, -4\sqrt{6})$

70) $16x^2 - 9y^2 = 144$

71) $\frac{(x-1)^2}{16} - \frac{(y+2)^2}{4} = 1$

Write an equation of the circle with the given center and radius.

54) (9, -5); 11

Solve the nonlinear system of equations for real solutions.

72) $\begin{cases} y = x^2 - 2 \\ 9x - y = 18 \end{cases}$

55) (0, -5); $\sqrt{11}$

73) $\begin{cases} y = x - 10 \\ x^2 - y^2 = 100 \end{cases}$

Find the center and the radius of the circle. Do not graph.

56) $x^2 + y^2 + 10x + 6y + 23 = 0$

74) $\begin{cases} x = y^2 - 4 \\ x = y^2 - 1y \end{cases}$

57) $x^2 + y^2 - 14x - 4y + 4 = 0$

75) $\begin{cases} x^2 + y^2 = 130 \\ x^2 - y^2 = 32 \end{cases}$

58) $x^2 + y^2 - 8x + 2y + 17 = 25$

76) $\begin{cases} 4x^2 + y^2 = 16 \\ 4x^2 - y^2 = 16 \end{cases}$

Sketch the graph of the equation. If the graph is a parabola, find its vertex. If the graph is a circle, find its center and radius. If it's an ellipse or hyperbola, find center and values of a and b.

59) $x = -4y^2$

Solve.

60) $x = (y + 5)^2 - 5$

77) The sum of the squares of two numbers is 45. The sum of the two numbers is 3. Find the two numbers.

61) $x = y^2 + 10y + 24$

78) A rectangular holding pen for sheep is to be designed so that its perimeter is 40 meters and its area is 91 square meters. Find the dimensions of the holding pen.

62) $y = 2x^2 - 16x + 33$

63) $4x^2 + 4y^2 = 16$

64) $x^2 + (y + 3)^2 = 9$

65) $(x - 2)^2 + (y - 1)^2 = 16$

66) $16x^2 + 25y^2 = 400$

Answer Key

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1) $(f - g)(x) = -9x^2 + x - 6$

2) $(f \cdot g)(x) = 15x^5 - 6x^3 + 5x^2 - 2$

3) $(\frac{f}{g})(x) = \frac{\sqrt{x}}{4x-1}$, where $x \neq \frac{1}{4}$

4) $8x + 11$

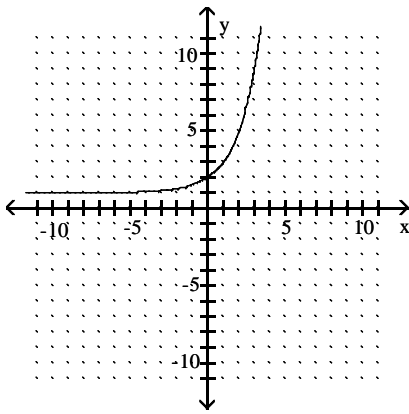
5) $8\sqrt{x+9} - 13$

6) $-27x^3 - 9x$

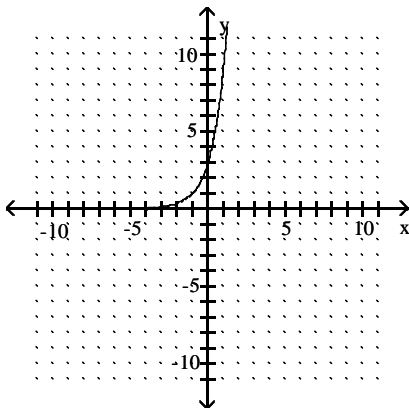
7) $f^{-1}(x) = \frac{x-9}{5}$

8) $f^{-1}(x) = \sqrt[3]{x-4}$

9)



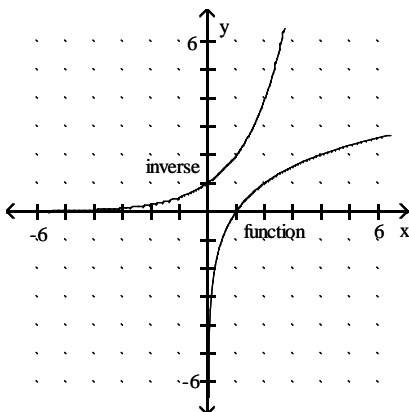
10)



11) No

12) Yes

13)



14) $\frac{2}{3}$

15) 3

16) $\frac{20}{17}$

17) 81

18) 9

19) 0

20) $10^{3.9}$

21) 0.9323

22) 2.0138

23) 0.3297

24) -3

25) 20

26) 0

27) 1

28) $\log_4(x-5) - 8\log_4 x$

29) $\log_y 7 + \log_y x - \log_y 4$

30) $\log_6 \frac{x-4}{x-1}$

31) $\log_a \frac{xz^3}{y}$

32) 1.1417

33) -0.0200

34) 3.4342

35) -0.0080

36) 0.4307

37) 1.1828

38) 0.2696

39) -6.3691

40) -0.3906

41) $\frac{\log 4}{\log 3} - 6$

42) $\frac{\ln 7}{2}$

43) 7, -1

44) 9

45) $\frac{1}{12}$

46) 7, -4

47) 5

48) 251.278

49) \$1328.17

50) 173

51) 1.4 years

52) $2\sqrt{13}$ units

53) $(\frac{13\sqrt{3}}{2}, \frac{-11\sqrt{6}}{2})$

54) $(x-9)^2 + (y+5)^2 = 121$

Answer Key

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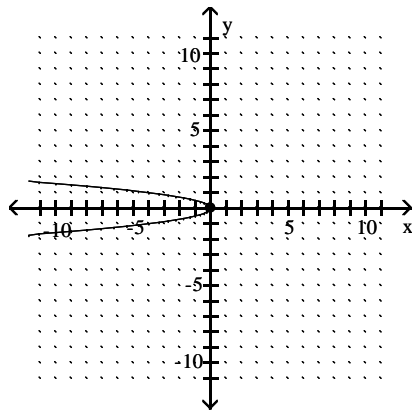
55) $x^2 + (y + 5)^2 = 11$

56) center $(-5, -3)$, radius $= \sqrt{11}$

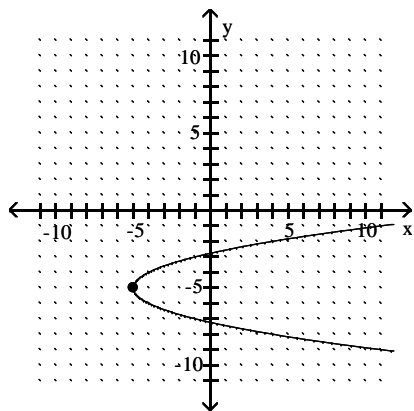
57) center $(7, 2)$, radius $= 7$

58) center $(4, -1)$, radius $= 5$

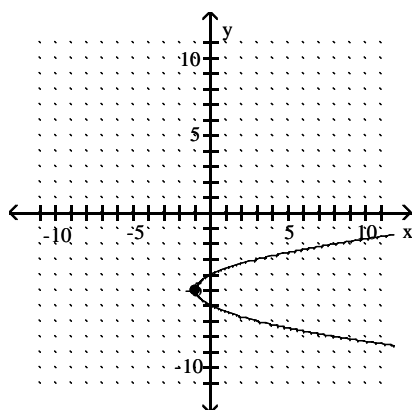
59) vertex $(0, 0)$



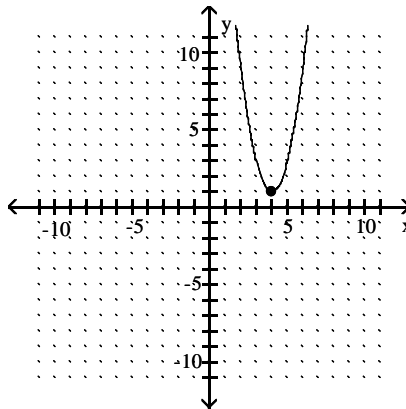
60) vertex $(-5, -5)$



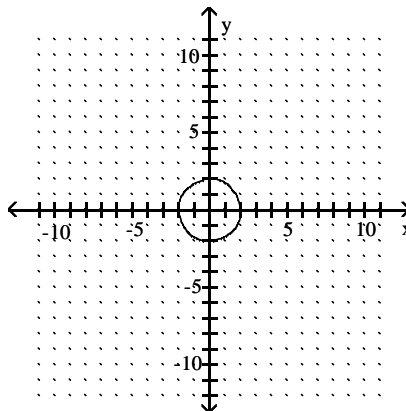
61) vertex $(-1, -5)$



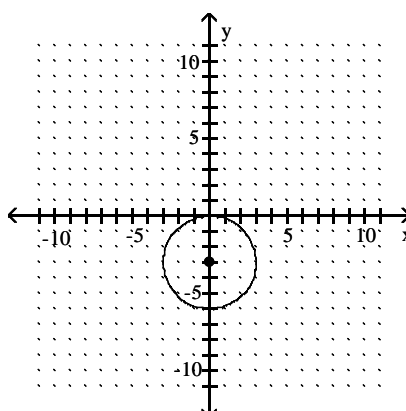
62) vertex $(4, 1)$



63) center $(0, 0)$; radius $= 2$



64) center $(0, -3)$; radius $= 3$



65) center $(2, 1)$; radius $= 4$

