

Perform the indicated operations. Write the result using only positive exponents. Assume all variables represent nonzero real numbers.

1) $\frac{(3x^5y^6)^4}{9xy^2}$

A) $9x^8y^8$

B) $9x^{19}y^{22}$

C) $\frac{x^{19}y^{22}}{3}$

D) $\frac{x^8y^8}{3}$

Factor the trinomial completely.

2) $5x^3 + 5x^2y - 30xy^2$

A) $5x(x + 2y)(x - 3y)$

C) $(x - 2y)(5x^2 + 15xy)$

B) $(5x^2 + 10xy)(x - 3y)$

D) $5x(x - 2y)(x + 3y)$

Factor.

3) $121k^2 - 25m^2$

A) $(11k + 5m)(11k - 5m)$

C) $(11k - 5m)^2$

B) $(121k + m)(k - 25m)$

D) $(11k + 5m)^2$

Perform the indicated operations.

4) $\frac{x}{x^2 - 16} - \frac{6}{x^2 + 5x + 4}$

A) $\frac{x^2 - 5}{(x - 4)(x + 4)(x + 1)}$

C) $\frac{x^2 - 5x + 24}{(x - 4)(x + 4)}$

B) $\frac{x^2 + 5x + 24}{(x - 4)(x + 4)(x + 1)}$

D) $\frac{x^2 - 5x + 24}{(x - 4)(x + 4)(x + 1)}$

Simplify.

5) $4 + \frac{2}{\frac{s}{4} + \frac{1}{8}}$

A) $\frac{16}{s}$

B) $\frac{s}{16}$

C) 16

D) 1

Simplify. Assume that all variables represent positive real numbers.

6) $6\sqrt{48x^2} - 2\sqrt{27x^2} - \sqrt{3x^2}$

A) $3x\sqrt{21}$

B) $4x\sqrt{21}$

C) $17x\sqrt{3}$

D) $18x\sqrt{3}$

Solve the equation.

7) $\frac{x - 5}{5} = \frac{x - 5}{2}$

A) $\left\{\frac{35}{3}\right\}$

B) $\{5\}$

C) $\left\{\frac{20}{3}\right\}$

D) $\left\{-\frac{15}{7}\right\}$

Find the product. Write the answer in standard form.

8) $(6 + 3i)^2$

A) $27 - 36i$

B) $45 + 36i$

C) $27 + 36i$

D) $45 - 36i$

Solve the equation using the quadratic formula.

9) $2x^2 + 12x = -7$

A) $\left\{ \frac{-6 \pm \sqrt{22}}{2} \right\}$

B) $\left\{ \frac{-12 \pm \sqrt{22}}{2} \right\}$

C) $\left\{ \frac{-6 \pm \sqrt{22}}{4} \right\}$

D) $\left\{ \frac{-6 \pm \sqrt{2}}{2} \right\}$

Solve the problem.

10) A ball is dropped from a cliff that is 352 feet high. The distance S (in feet) that it falls in t seconds is given by the formula $S = 16t^2$. How many seconds (to tenths) will it take for the ball to hit the ground?

A) 18.8 sec

B) 7744 sec

C) 4.7 sec

D) 18.3 sec

Solve the equation.

11) $\sqrt{x+7} + 5 = x$

A) $\{2, 9\}$

B) $\{9\}$

C) $\{9, 18\}$

D) $\{2\}$

12) $(3x - 6)^2 + 5(3x - 6) + 4 = 0$

A) $\left\{ \frac{5}{3}, -\frac{2}{3} \right\}$

B) $\left\{ \frac{7}{3}, -\frac{10}{3} \right\}$

C) $\left\{ \frac{5}{3}, \frac{2}{3} \right\}$

D) $\left\{ -\frac{7}{6}, \frac{10}{3} \right\}$

Solve.

13) $|5x + 2| - 4 = -11$

A) $\left\{ 1, \frac{9}{5} \right\}$

B) $\left\{ -1, -\frac{9}{5} \right\}$

C) $\left\{ -\frac{9}{5} \right\}$

D) \emptyset

Solve the quadratic inequality. Write the solution set in interval notation.

14) $x^2 - 4x - 5 < 0$

A) $(5, \infty)$

B) $(-\infty, -1) \cup (5, \infty)$

C) $(-1, 5)$

D) $(-\infty, -1)$

Give the focus, directrix, and axis for the parabola.

15) $x^2 = 20y$

A) $(5, 0)$, $y = 5$, y -axis

B) $(5, 0)$, $x = 5$, x -axis

C) $(0, -5)$, $x = -5$, x -axis

D) $(0, 5)$, $y = -5$, y -axis

Write the equation of the line.

16) x -intercept 4, y -intercept 4

A) $4x + 4y = 16$

B) $4x - 4y = 16$

C) $4x + 4y = -16$

D) $-4x + 4y = 16$

Solve the problem.

17) Find $f(4)$ when $f(x) = 4x^2 + 3x - 6$

A) 46

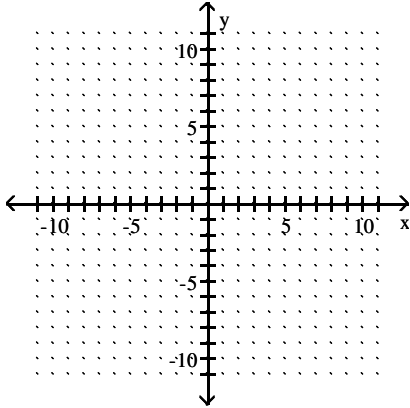
B) 82

C) 70

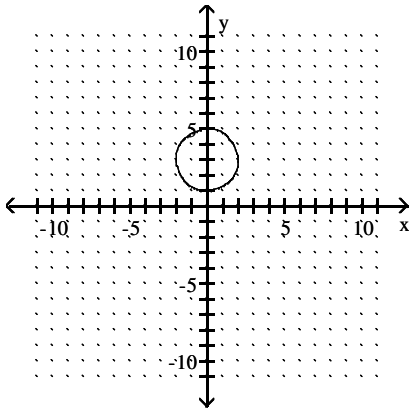
D) 22

Graph the circle.

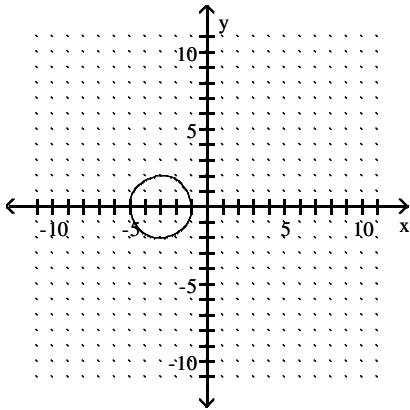
18) $(x - 3)^2 + y^2 = 4$



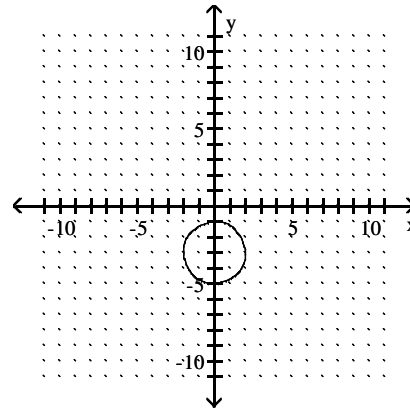
A)



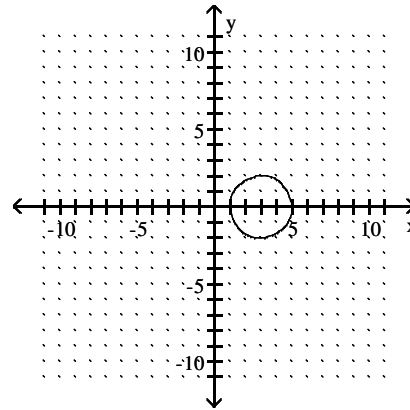
C)



B)



D)



Find the indicated composite for the pair of functions.

19) $(g \circ f)(x)$: $f(x) = -5x + 9$, $g(x) = 4x + 3$

A) $-20x + 24$

B) $20x + 39$

C) $-20x - 33$

D) $-20x + 39$

If f is one-to-one, find an equation for its inverse.

20) $f(x) = -5x + 1$

A) $f^{-1}(x) = -\frac{1}{5}x + \frac{1}{5}$

B) $f^{-1}(x) = -\frac{1}{5}x + 1$

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

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

Use synthetic division to perform the division.

$$21) \frac{x^4 - 4x^3 - 15x^2 + 19x - 6}{x - 6}$$

- A) $x^3 + 2x^2 - 3x + 1$ B) $x^3 + 3x^2 - 3x - 1$ C) $x^3 + 2x^2 - 6x$ D) $x^3 + 2x^2 - 6x + 3$

Use the remainder theorem and synthetic division to find f(k).

$$22) k = 3; f(x) = -x^3 - 3x^2 + 5$$

- A) 46 B) 3 C) 49 D) -49

Use the factor theorem to decide whether or not the second polynomial is a factor of the first.

$$23) 5x^2 - 27x + 34; x - 2$$

- A) No B) Yes

Factor f(x) into linear factors given that k is a zero of f(x).

$$24) f(x) = x^3 - 2x^2 - 36x + 72; k = 6$$

- A) $(x - 6)(x - 2)(x + 2)$ B) $x(x - 6)(x - 2)$ C) $(x - 6)(x - 2)(x + 6)$ D) $(x - 6)(x + 2)(x + 6)$

Find the correct end behavior diagram for the given polynomial function.

$$25) P(x) = -7x^3 + 2x^2 + 7x - 4$$

- A)  B)  C)  D) 

Give all possible rational zeros for the following polynomial.

$$26) P(x) = 2x^3 + 9x^2 + 14x - 8$$

- A) $\pm 1, \pm 2, \pm 4, \pm 8$ B) $\pm 1, \pm 1/2, \pm 1/4, \pm 1/8, \pm 2$
 C) $\pm 1, \pm 1/2, \pm 2, \pm 4, \pm 8$ D) $\pm 1, \pm 2, \pm 4$

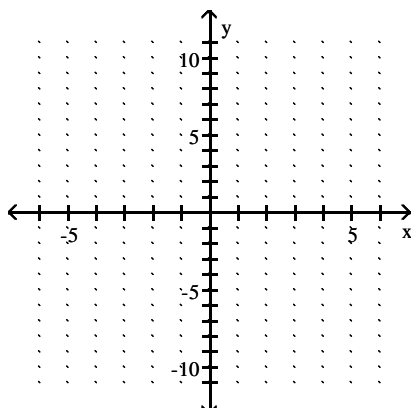
Find the zeros of the polynomial function and state the multiplicity of each.

$$27) f(x) = 5(x + 8)^2(x - 8)^3$$

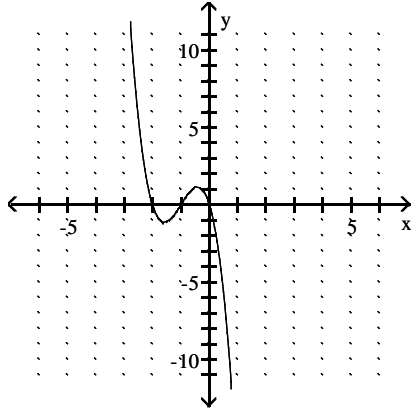
- A) -8, multiplicity 2; 8, multiplicity 3
 B) 4, multiplicity 1; 8, multiplicity 1; -8, multiplicity 1
 C) 4, multiplicity 1; -8, multiplicity 3; 8, multiplicity 3
 D) -8, multiplicity 3; 8, multiplicity 2

Graph the polynomial function. Factor first if the expression is not in factored form.

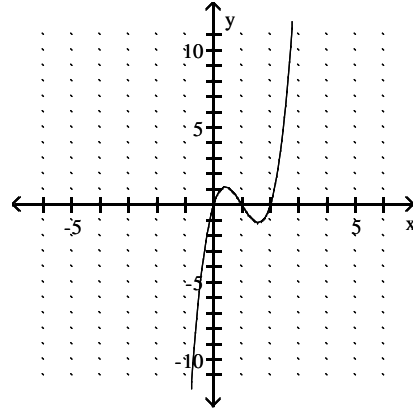
$$28) f(x) = -3x(x + 2)(x + 1)$$



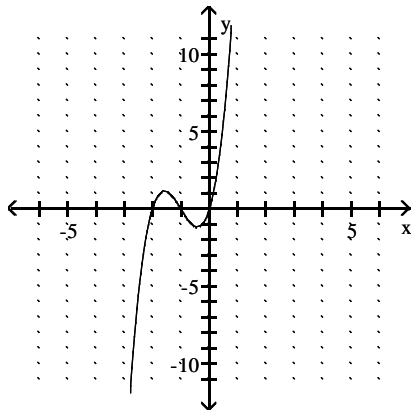
A)



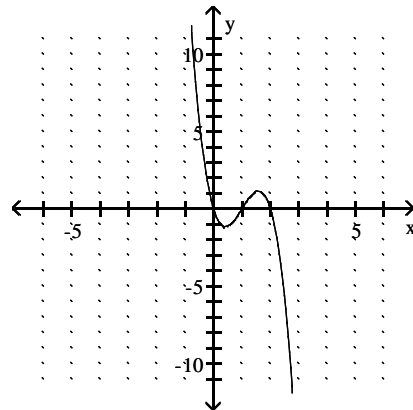
B)



C)

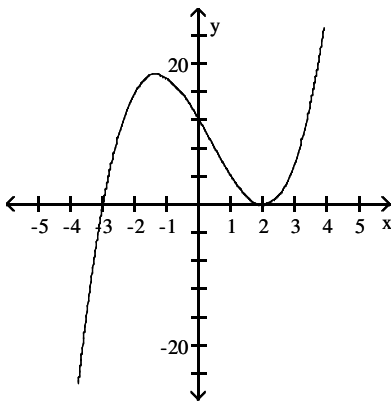


D)



Solve the problem.

29) The graph of $f(x) = x^3 - x^2 - 8x + 12$ is shown below. Use the graph to factor $f(x)$.



A) $f(x) = (x - 3)(x + 2)^2$

C) $f(x) = (x + 3)(x - 2)^2$

B) $f(x) = -(x + 3)(x - 2)^2$

D) $f(x) = x(x + 3)(x - 2)$

Find any vertical asymptotes.

30) $h(x) = \frac{4x - 1}{x^2 + 6x - 7}$

A) $y = 4$

B) $x = -1, x = 7$

C) $y = 1, y = -7$

D) $x = 1, x = -7$

Find the horizontal asymptote of the given function.

31) $g(x) = \frac{x+5}{x^2-3}$

A) $y = 3$

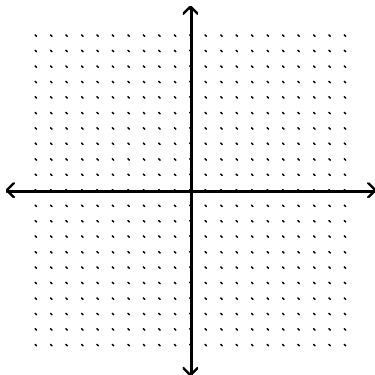
B) $y = 1$

C) $y = 0$

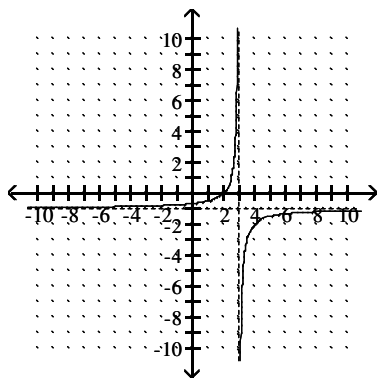
D) None

Sketch the graph of the rational function.

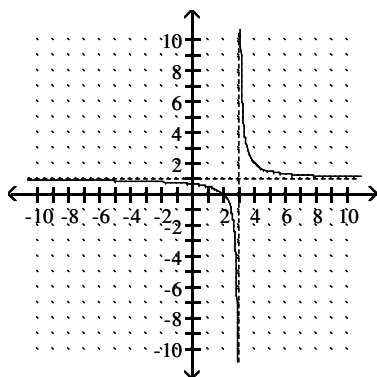
32) $f(x) = \frac{x-2}{x+3}$



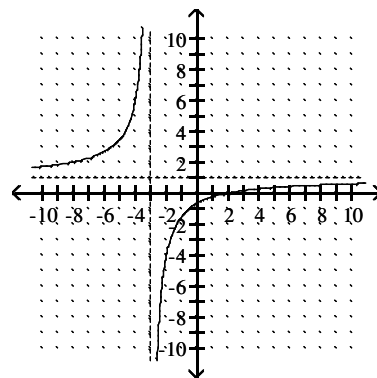
A)



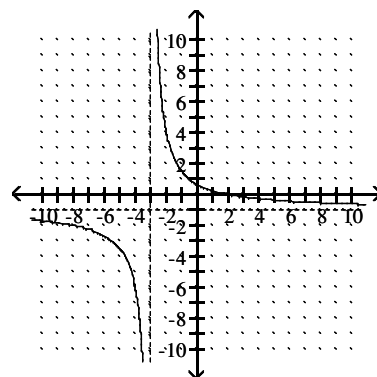
C)



B)



D)



Find the function value. If the result is irrational, round your answer to the nearest thousandth.

33) Let $f(x) = 4^x$. Find $f(5/2)$.

A) 10

B) 512

C) 32

D) 1.741

Solve the equation.

$$34) 4(5 + 3x) = \frac{1}{256}$$

A) $\{-3\}$

B) $\{3\}$

C) $\{4\}$

D) $\left\{\frac{1}{64}\right\}$

Write in logarithmic form.

$$35) 10^{-2} = 0.01$$

A) $\log_{10} -2 = 0.01$

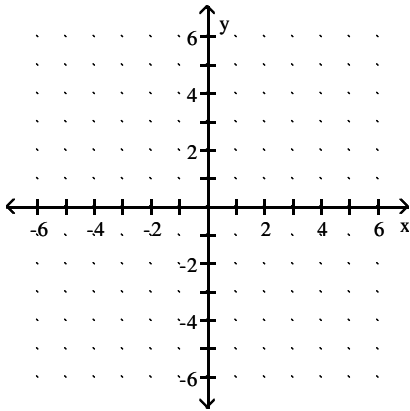
B) $\log_2 -2 = .10$

C) $\log_{10} 0.01 = -2$

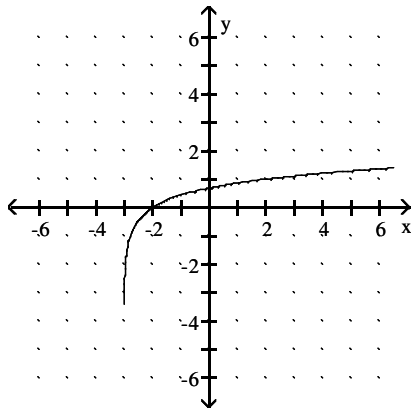
D) $\log_2 .10 = -2$

Graph the function.

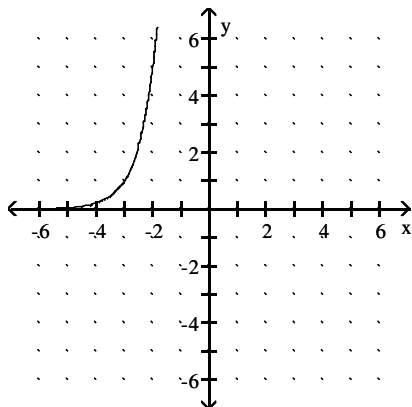
$$36) f(x) = \log_5 (x + 3)$$



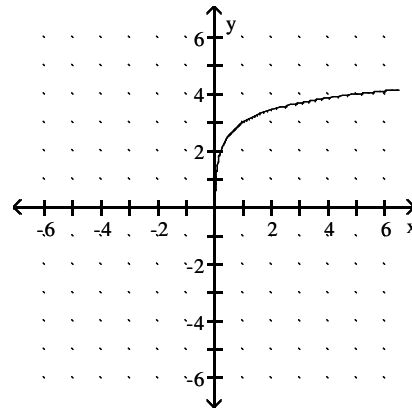
A)



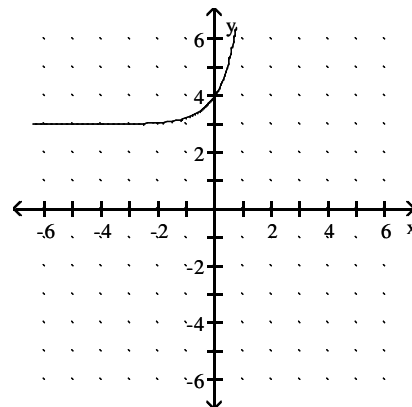
C)



B)



D)



Write the expression as a sum, difference, or product of logarithms. Assume that all variables represent positive real numbers.

37) $\log_3 \left(\frac{x^5 y^3}{3} \right)$

- A) $5 \log_3 x + 3 \log_3 y - \log_3 3$
- B) $(\log_3 x)^5 + (\log_3 y)^3 - \log_3 3$
- C) $(5 \log_3 x)(3 \log_3 y) \div \log_3 3$
- D)
- E) $5 \log_3 x + 3 \log_3 y + \log_3 3$

Solve the equation and express the solution in exact form.

38) $\ln(18x + 3) = \ln 11$

A) $\left\{ \frac{7}{9} \right\}$

B) $\left\{ \frac{4}{9} \right\}$

C) $\left\{ \frac{7}{18} \right\}$

D) $\left\{ -\frac{4}{9} \right\}$

Solve the equation. If necessary, round to the nearest thousandth.

39) $5e^{4x+5} = 6$

A) $\{0.136\}$

B) $\{-1.204\}$

C) $\{-2.636\}$

D) $\{-2.544\}$

Solve the equation and express the solution in exact form.

40) $\log 4x = \log 5 + \log(x + 1)$

A) $\{-5\}$

B) $\{5\}$

C) $\{2\}$

D) $\left\{ \frac{5}{9} \right\}$