Name_____

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x –axis at each x –intercept.

1) $f(x) = 3(x - 4)(x + 6)^4$ 1) _____

A) –4, multiplicity 1, touches x–axis; 6, multiplicity 4, crosses x–axis

B) 4, multiplicity 1, touches x–axis; –6, multiplicity 4, crosses x–axis

C) 4, multiplicity 1, crosses x–axis; –6, multiplicity 4, touches x–axis

D) –4, multiplicity 1, crosses x–axis; 6, multiplicity 4, touches x–axis

2) $f(x) = 5(x^2 + 2)(x - 4)^2$ 2) _____

A) 4, multiplicity 2, crosses x–axis

B) –2, multiplicity 1, crosses x–axis; 4, multiplicity 2, touches x–axis

C) –2, multiplicity 1, touches x–axis; 4, multiplicity 2, crosses x–axis

D) 4, multiplicity 2, touches x–axis

3) $f(x) = (x + \frac{1}{2})^3 (x - 1)^3$ 3) _____

A) $-\frac{1}{2}$, multiplicity 3, crosses x–axis; 1, multiplicity 3, crosses x–axis

B) $\frac{1}{2}$, multiplicity 3, crosses x–axis; –1, multiplicity 3, touches x–axis

C) $-\frac{1}{2}$, multiplicity 3, crosses x–axis; 1, multiplicity 3, touches x–axis

D) $\frac{1}{2}$, multiplicity 3, touches x–axis; –1, multiplicity 3, crosses x–axis

Find the x–intercepts and y–intercepts (if they exist).

4) $f(x) = 2x^2 - 8x - 10$ 4) _____

A) x–intercepts (5, 0) and (1, 0); y–intercept (0,10)

B) x–intercepts (–2, 0) and $(\frac{5}{2}, 0)$; y–intercept (0,10)

C) x–intercepts (–2, 0) and $(\frac{5}{2}, 0)$; y–intercept (0,–10)

D) x–intercepts (5, 0) and (– 1, 0); y–intercept (0,–10)

Decide whether the graph has an asymptote, a hole, or neither at x = t.

5) $\frac{1}{x(x - t)}$ 5) _____

A) Neither B) Hole C) Asymptote

6) $\frac{(x - t)(\frac{1}{x + t})}{x - t}$ 6) _____

A) Asymptote B) Neither C) Hole

7) $\frac{x}{x + t}$ 7) _____

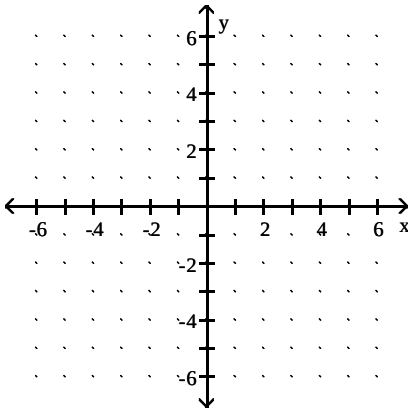
A) Hole B) Neither C) Asymptote

8) $\frac{x^2 - 2xt - t^2}{x^2 + 2xt + t^2}$ 8) _____

A) Asymptote B) Neither C) Hole

Graph the function.

9) $f(x) = \frac{2x}{(x + 2)(x + 1)}$ 9) _____



Give the equation of the specified asymptote(s).

10) Vertical asymptote(s): $h(x) = \frac{(x - 2)(x + 8)}{x^2 - 1}$ 10) _____

A) $x = 1, x = -1$ B) $x = -2, x = 8$ C) None D) $x = 2, x = -8$

11) Horizontal asymptote: $g(x) = \frac{x^2 + 8x - 3}{x - 3}$ 11) _____

A) $y = 7$ B) None C) $y = -8$ D) $y = 3$

12) Horizontal asymptote: $h(x) = \frac{9x^2 - 4x - 2}{7x^2 - 5x + 8}$ 12) _____

A) $y = \frac{9}{7}$ B) None C) $y = 0$ D) $y = \frac{4}{5}$

Answer the question.

13) Is there y–axis symmetry for the rational function $f(x) = \frac{-4x^2}{-2x^4 - 16}$? 13) _____

A) Yes B) No

14) Is there y–axis symmetry for the rational function $f(x) = \frac{-8x^2}{6x^3 - 2}$? 14) _____

A) Yes B) No

15) Is there origin symmetry for the rational function $f(x) = \frac{-8x}{9x^2 + 20}$? 15) _____

A) Yes B) No

16) Is there origin symmetry for the rational function $f(x) = \frac{-3x^2 + 13}{6x}$? 16) _____

A) No B) Yes

Find the indicated intercepts of the graph of the function.

17) x–intercepts of $f(x) = \dfrac{x - 6}{x^2 + 9x - 3}$ 17) _____

A) None B) (6, 0) C) (2, 0) D) (9, 0)

18) x–intercepts of $f(x) = \dfrac{(x - 4)(2x + 3)}{x^2 + 4x - 9}$ 18) _____

A) None B) (–4, 0) and (3/2, 0)

C) (4, 0) and (–3/2, 0) D) (4, 0) and (–3, 0)

19) y–intercepts of $f(x) = \dfrac{x - 14}{x^2 + 5x - 4}$ 19) _____

A) (0, 4) B) $(0, \frac{7}{2})$ C) None D) (0, 14)

20) y–intercepts of $f(x) = \dfrac{x^2 - 8x}{x^2 + 7x - 12}$ 20) _____

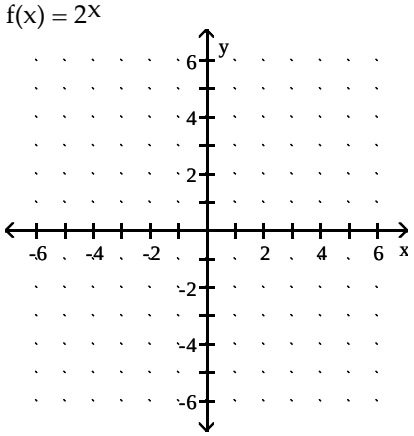
A) (0, 0) B) (0, 8) C) (0, 12) D) $(0, \frac{2}{3})$

21) y–intercepts of $f(x) = \dfrac{x^2 - 10x + 5}{8x}$ 21) _____

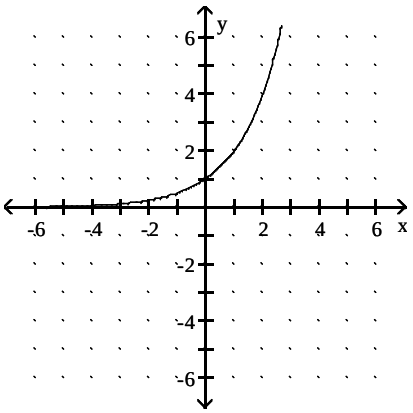
A) None B) (0, 8) C) (0, 5) D) $(0, \frac{5}{8})$

Graph the function.

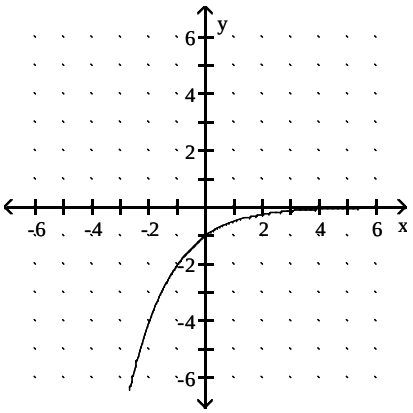
22) $f(x) = 2^x$ 22) _____



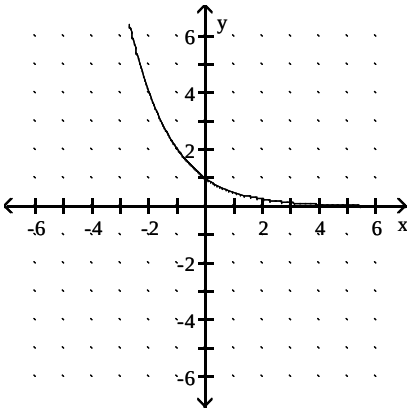
A)



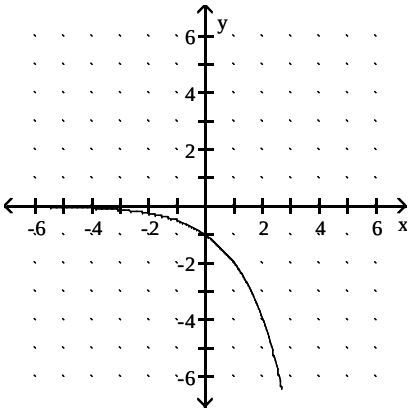
B)



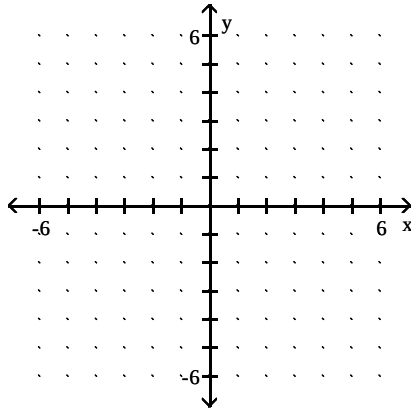
C)



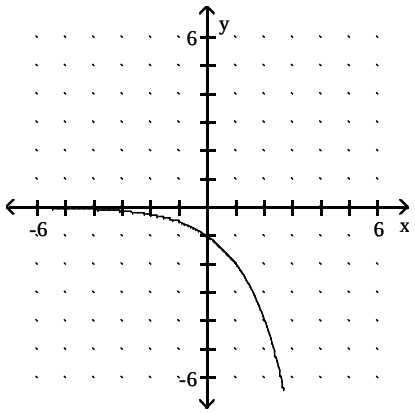
D)



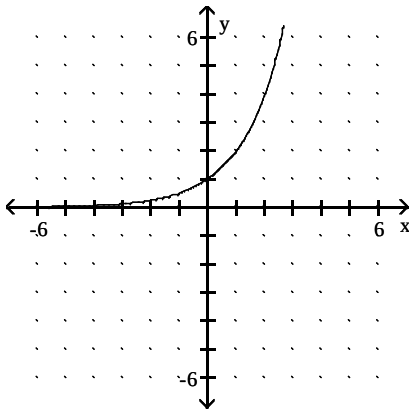
23) $y = (\frac{1}{2})^x$ 23) _____



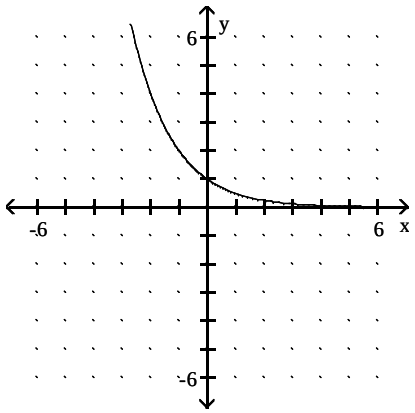
A)



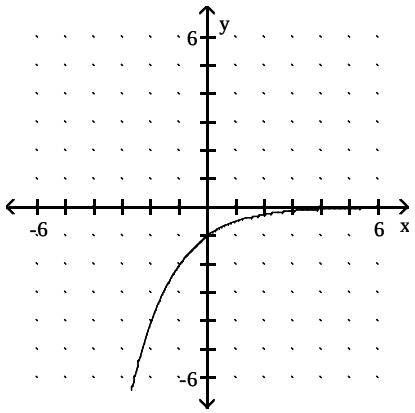
B)



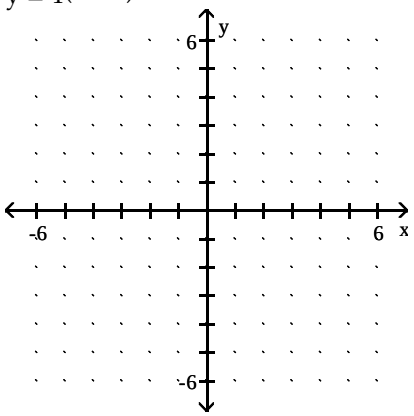
C)



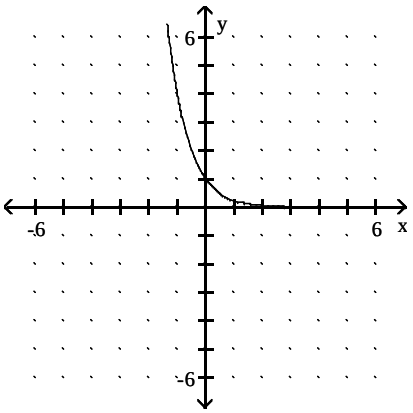
D)



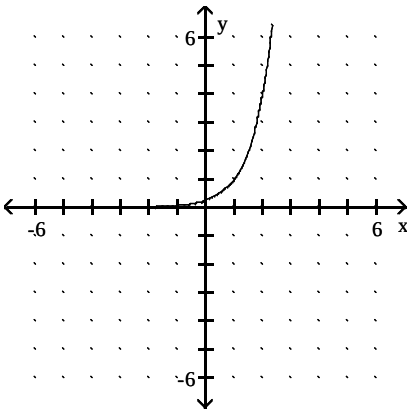
24) $y = 4^{(x - 1)}$ 24) _____



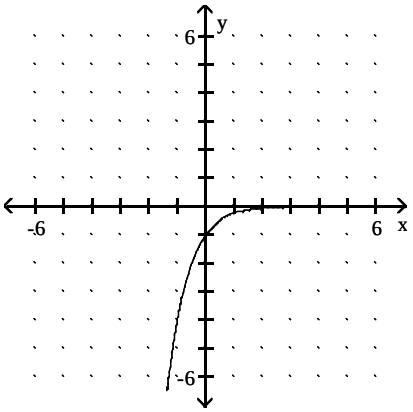
A)



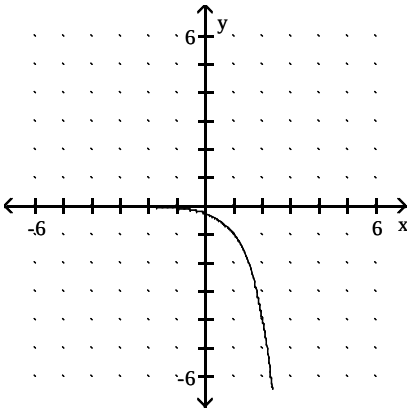
B)



C)



D)



Solve the equation.

25) $3^x = 81$ 25) _____

A) {5} B) {27} C) {3} D) {4}

26) $5^{-x} = \frac{1}{125}$ 26) _____

A) $\{\frac{1}{25}\}$ B) {3} C) $\{\frac{1}{3}\}$ D) {–3}

27) $2^{(8 - 2x)} = 4$ 27) _____

A) {3} B) {2} C) {–3} D) {4}

28) $4^{(5 - 3x)} = \frac{1}{256}$ 28) _____

A) {–3} B) {128} C) {3} D) $\{\frac{1}{64}\}$

29) $4^{(5 + 3x)} = \frac{1}{256}$ 29) _____

A) {–3} B) $\{\frac{1}{64}\}$ C) {3} D) {128}

Solve the problem.

30) A dot com company estimates that its stock value from the time of its initial public offering (IPO) follows the function $V(t) = e^{1.27t}$, where V(t) represents the value in year t, with t = 0 being 1996. Estimate the stock value in year 1999 to the nearest whole number. 30) _____

A) 13 B) 161 C) 10 D) 45

31) Since 1950, the growth in the world population in millions closely fits the exponential function $A(t) = 2600e^{0.018t}$, where t is the number of years since 1950. Estimate the population in the year 2006 to the nearest million. 31) _____

A) 7124 million
B) 6997 million
C) 7254 million
D) 62,038,562 million

32) The function $D(h) = 9e^{-0.4h}$ can be used to determine the milligrams D of a certain drug in a patient's bloodstream h hours after the drug has been given. How many milligrams (to two decimals) will be present after 12 hours? 32) _____

A) 0.07 mg
B) 5.35 mg
C) 1093.59 mg
D) 0.33 mg

Convert to logarithmic form.

33) $6^3 = 216$ 33) _____

A) $\log_6 216 = 3$
B) $\log_3 216 = 6$
C) $\log_6 3 = 216$
D) $\log_{216} 6 = 3$

34) $4^{-2} = \frac{1}{16}$ 34) _____

A) $\log_{1/16} 4 = -2$
B) $\log_{-2} \frac{1}{16} = 4$
C) $\log_4 \frac{1}{16} = -2$
D) $\log_4 -2 = \frac{1}{16}$

35) $e^x = 24$ 35) _____

A) $\log_{24} x = e$
B) $\ln x = 24$
C) $\log_x e = 24$
D) $\ln 24 = x$

Convert to exponential form.

36) $\log_{1/3} 81 = -4$ 36) _____

A) $81^{1/3} = 4$ B) $(-4)^{1/3} = 81$ C) $(\frac{1}{3})^{-4} = 81$ D) $(\frac{1}{3})^{4} = 81$

37) $\log_5 125 = 3$ 37) _____

A) $3^5 = 125$ B) $5^{125} = 3$ C) $125^3 = 5$ D) $5^3 = 125$

Find the value of the expression.

38) $\log_7 49$ 38) _____

A) 49 B) 14 C) 7 D) 2

Find the domain of the function.

39) $f(x) = \ln (3 - x)$ 39) _____

A) $x < 3$ B) $x < -3$ C) $x > -3$ D) $x > 3$

40) $f(x) = \ln (4x - x^2)$ 40) _____

A) $-4 < x < 4$ B) $0 < x < 4$ C) $x \leq 4$ D) $-4 \leq x < 0$

Express as a single logarithm.

41) $4 \log_b q - \log_b r$ 41) _____

A) $\log_b (q^4 - r)$ B) $\log_b q^4 \div \log_b r$

C) $\log_b \frac{4q}{r}$ D) $\log_b \frac{q^4}{r}$

42) $4\log_c 2 + 5\log_c 5$ 42) _____

A) $\log_c \frac{2^4}{5^5}$ B) $\log_c (8 + 25)$

C) $\log_c 2^4 \cdot \log_c 5^5$ D) $\log_c 2^4 5^5$

Solve the equation.

43) $\log 4x = \log 3 + \log (x - 1)$ 43) _____

A) {3} B) $\{\frac{2}{3}\}$ C) $\{-\frac{3}{7}\}$ D) {–3}

44) $\log (3 + x) - \log (x - 3) = \log 3$ 44) _____

A) $\{\frac{3}{2}\}$ B) {–6} C) {6} D) ∅

45) $\log_8 (2x - 7) = \log_8 (6x + 3)$ 45) _____

A) ∅ B) {–4} C) $\{-\frac{5}{2}\}$ D) {1}

46) $\log_9 (4x + 2) = \log_9 (4x + 7)$ 46) _____

A) $\{\frac{9}{5}\}$ B) {5} C) {0} D) ∅

47) $\log_9 x^2 = \log_9 (2x + 8)$ 47) _____

A) $\varnothing$ B) {4, –2} C) {4} D) $\{\frac{4}{9}\}$

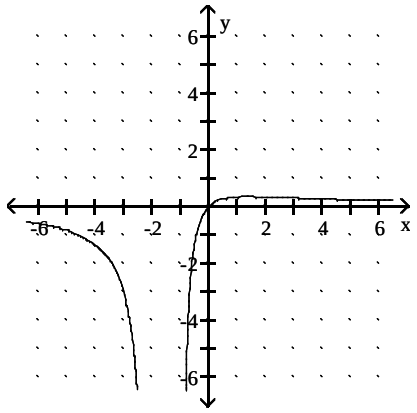
48) $3^{(x - 1)} = 15$ 48) _____

A) {3.46} B) {6.00} C) {1.46} D) {2.63}

49) $3^{(4x - 1)} = 17$ 49) _____

A) {0.89} B) {0.39} C) {0.27} D) {1.67}

1) C
2) D
3) A
4) D
5) C
6) C
7) B
8) B
9)



10) A
11) B
12) A
13) A
14) B
15) A
16) B
17) B
18) C
19) B
20) A
21) A
22) A
23) C
24) B
25) D
26) B
27) A
28) C
29) A
30) D
31) A
32) A
33) A
34) C
35) D
36) C
37) D
38) D

39) A
40) B
41) D
42) D
43) D
44) C
45) C
46) D
47) B
48) A
49) A