Math 98 - Final Review

Name_____

Solve the equation.

1) $-4a + 5 + 5a = 6 - 26$ 1) _____

2) $4(3x - 1) = 16$ 2) _____

3) $4(2y - 4) = 7(y + 3)$ 3) _____

Solve the problem.

4) A 9-ft. board is cut into 2 pieces so that one piece is 5 feet longer than 3 times the shorter piece. If the shorter piece is x feet long, find the lengths of both pieces. 4) _____

Add the polynomials.

5) $(8x^2 - 4x - 8) + (-3x^2 - 4x - 6)$ 5) _____

Subtract the polynomials.

6) $(2x^6 - 4x^3 - 18) - (-6x^3 + 8x^6 - 17)$ 6) _____

Multiply the monomials.

7) $(-4x^2)(9x^8)$ 7) _____

Find the product.

8) $(7x - 1)(x^2 - 2x + 1)$ 8) _____

Multiply by using the rule for the square of a binomial.

9) $(3x - 11)^2$ 9) _____

Divide as indicated.

10) $\frac{25x^3 + 5x^2 + 13x + 11}{5x - 1}$ 10) _____

Factor the polynomial using the negative of the greatest common factor.

11) $-2x^4 - 14x^3 + 10x^2$ 11) _____

Factor completely.

12) $x^2 + 9x + 20$ 12) _____

13) $x^2 + 7x - 30$ 13) _____

Factor completely using the trial and error method to factor trinomials. If unfactorable, indicate that the polynomial is prime.

14) $3x^2 + 17x + 10$ 14) _____

Factor completely. If unfactorable, indicate that the polynomial is prime.

15) $36x^2 - 49$ 15) _____

Solve the equation.

16) $x^2 + 4x - 60 = 0$ 16) _____

Simplify the rational expression.

17) $\frac{x^2 - 9x + 18}{x^2 - 10x + 24}$ 17) _____

18) $\frac{4x^2 + 8x}{3x^2 + 8x + 4}$ 18) _____

Perform the indicated operation. Simplify the result, if possible.

19) $\frac{5y - 5}{(y - 3)^2} \div \frac{y^2 - 1}{y - 3}$ 19) _____

20) $\frac{x^2 + 5x + 6}{x^2 + 3x} \cdot \frac{x^2}{x^2 - 4}$ 20) _____

21) $\frac{x}{x + 7} + \frac{4}{x - 7}$ 21) _____

22) $\frac{6y}{y^2 - 1} - \frac{3}{y - 1}$ 22) _____

Simplify the complex rational expression.

23) $\frac{\frac{4}{x} - \frac{3}{y}}{\frac{3}{x} + \frac{5}{y}}$ 23) _____

Solve the rational equation.

24) $\frac{8}{x} - \frac{1}{4} = \frac{4}{x}$ 24) _____

25) $\frac{1}{x} + \frac{1}{x + 4} = \frac{x + 5}{x + 4}$ 25) _____

Find the domain and range.

26) {(4,5), (-5,-3), (10,-8), (10,2)} 26) _____

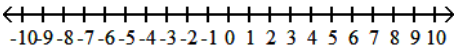
Decide whether the relation is a function.

27) {(-5, 8), (-3, -3), (-1, -5), (-1, -7)} 27) _____

28) {(-3, 5), (2, -7), (5, -1), (8, -9), (12, 9)} 28) _____

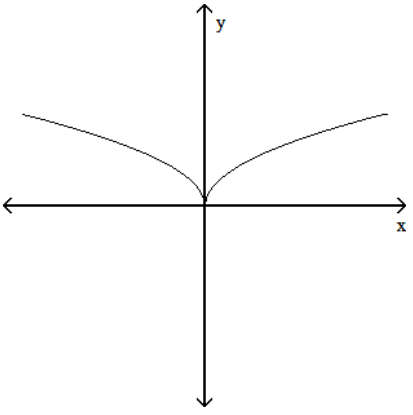
Express the interval in set builder notation and graph the interval on a number line.

29) [-7, 3) 29) _____



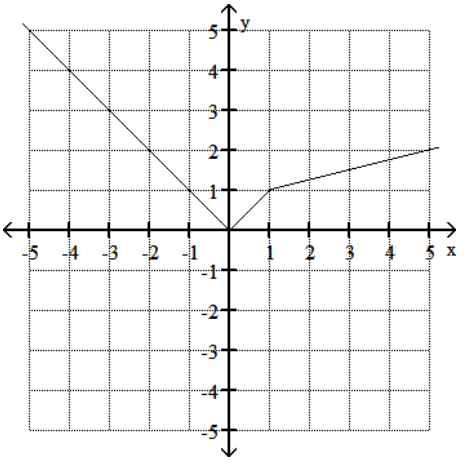
Use the vertical line test to determine whether or not the graph is a graph of a function.

30) 30) _____



Use the graph to find the indicated function value.

31) y = f(x). Find f(-4) 31) _____

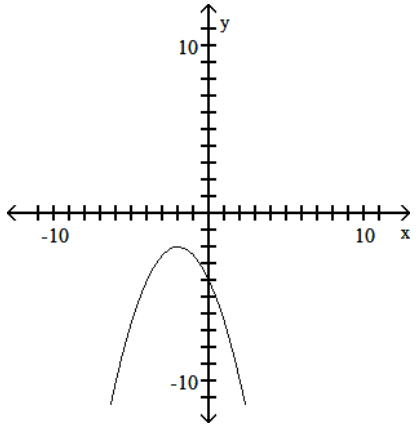


Find the indicated function value.

32) Find f(-3) when f(x) = 2x + 18. 32) _____

33) Find g(a - 1) when g(x) = 5x - 3. 33) _____

Determine if the graph represents a function that has an inverse function.

34) 

34) _____

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

35) $f(x) = 8x + 7$ 35) _____

36) $f(x) = -11x$ 36) _____

Use properties of rational exponents to simplify the expression. Assume that any variables represent positive numbers.

37) $(b^3)^{2/3}$ 37) _____

Use rational exponents to simplify the radical. If rational exponents appear after simplifying, write the answer in radical notation.

38) $\sqrt[12]{x^8}$ 38) _____

Simplify by factoring.

39) $\sqrt{320x}$ 39) _____

Simplify by factoring. Assume that any variable in a radicand represents a positive real number.

40) $\sqrt{12x^3}$ 40) _____

41) $\sqrt[3]{16x^{14}y^{12}}$ 41) _____

Perform the indicated operation and, if possible, simplify. Assume that all variables represent positive real numbers.

42) $-4\sqrt{3} - 9\sqrt{12}$ 42) _____

Multiply and simplify. Assume that all variables in a radicand represent positive real numbers.

43) $\sqrt{20x} \cdot \sqrt{4x}$ 43) _____

Perform the indicated operation and, if possible, simplify. Assume that all variables represent positive real numbers.

44) $\dfrac{\sqrt[3]{40x^6}}{\sqrt[3]{5x^2}}$ 44) _____

Solve the equation.

45) $\sqrt{6x - 5} = 5$ 45) _____

Rationalize the denominator and simplify.

46) $\dfrac{3x}{\sqrt{2x}}$ 46) _____

Rationalize the denominator.

47) $\dfrac{5}{8 - \sqrt{5}}$ 47) _____

Solve the problem.

48) The formula $v = \sqrt{2.5r}$ models the safe maximum speed, v, in miles per hour, at which a car can travel on a curved road with radius of curvature, r, in feet. A highway crew measures the radius of curvature at an exit ramp as 810 feet. What is the maximum safe speed? 48) _____

Solve the equation by the square root property. If possible, simplify radicals or rationalize denominators. Express imaginary solutions in the form a + bi.

49) $6x^2 = 96$ 49) _____

Solve the quadratic equation by completing the square.

50) $x^2 + 14x + 39 = 0$ 50) _____

Use the quadratic formula to solve the equation.

51) $x^2 + 10x + 6 = 0$ 51) _____

52) $5x^2 - 3x - 8 = 0$ 52) _____

Solve the problem.

53) A person standing close to the edge on top of a 128-foot building throws a baseball vertically upward. The quadratic function $s(t) = -16t^2 + 64t + 128$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. How many seconds does it take until the ball finally hits the ground? Round to the nearest tenth of a second if necessary. 53) _____

54) The owner of a video store has determined that the cost C, in dollars, of operating the store is approximately given by $C(x) = 2x^2 - 28x + 730$, where x is the number of videos rented daily. Find the lowest cost to the nearest dollar. 54) _____

Solve.

55) The rabbit population in a forest area grows at the rate of 8% monthly. If there are 240 rabbits in September, find how many rabbits (rounded to the nearest whole number) should be expected by next September. Use the function $f(x) = 240(2.7)^{0.08t}$. 55) _____

Provide an appropriate response.

56) Use $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve this problem. 56) _____

Suppose that you have $10,000 to invest. Which investment yields the greater return over 7 years: 6.25% compounded continuously or 6.3% compounded semiannually?

57) Write in exponential form: $\log_5 125 = 3$ 57) _____

58) Write in logarithmic form: $\sqrt[3]{125} = 5$ 58) _____

Simplify the expression.

59) $\log_y y$ 59) _____

60) $\log_3 1$ 60) _____

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

61) $\ln 7 - 5 \ln x$ 61) _____

62) $5 \log x + 2 \log y$ 62) _____

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

63) $\log_{10}(100x^5)$ 63) _____

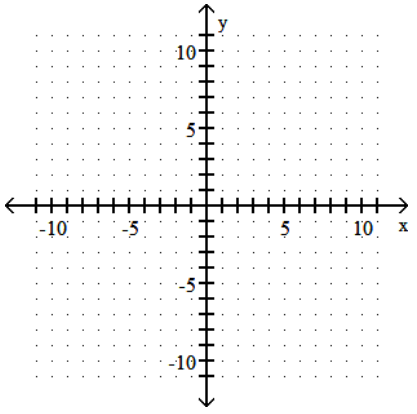
Solve the equation.

64) $2^{(3x - 1)} = 32$ 64) _____

65) $\log_{25} x = \frac{1}{2}$ 65) _____

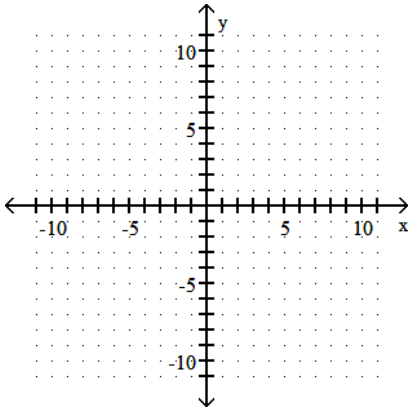
Graph the linear equation.

66) $6x - 18y = 36$ 66) _____



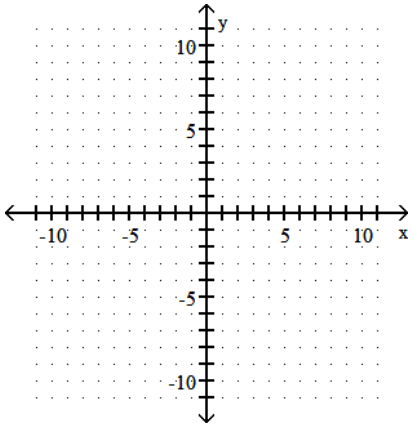
Graph the linear equation.

67) $y = \frac{1}{2}x + 5$ 67) _____



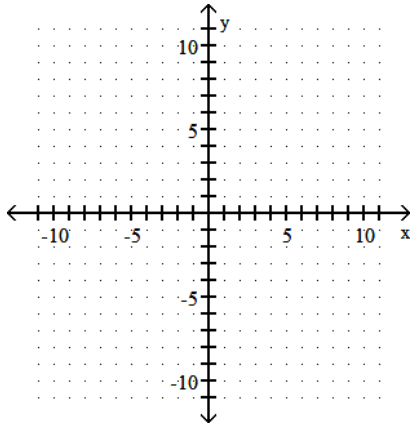
Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.

68) $f(x) = -(x + 1)^2 + 4$ 68) _____



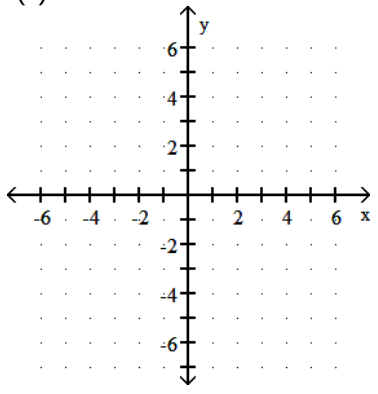
Sketch the graph of the quadratic function. Identify the vertex, intercepts, and the equation for the axis of symmetry.

69) $f(x) = x^2 + 4x - 7$ 69) _____



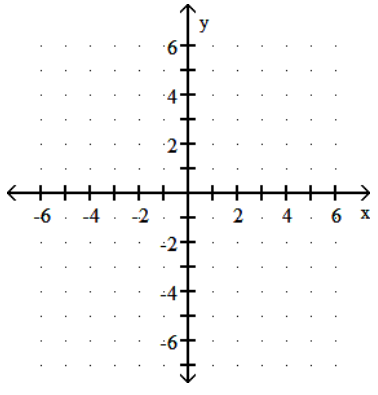
Graph the function by making a table of coordinates.

70) $f(x) = 2^x$ 70) _____

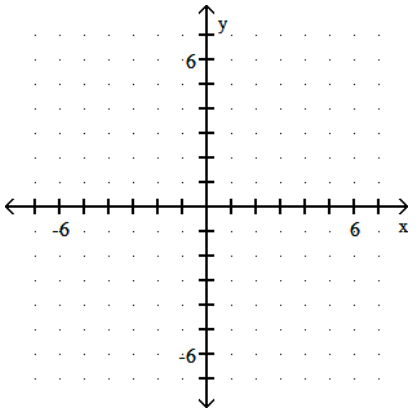


Graph the function.

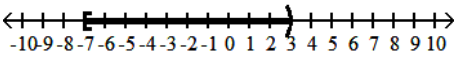
71) Use the graph of $f(x) = 2^x$ to obtain the graph of $g(x) = 2^x + 2$. 71) _____



72) $f(x) = \log_5 x$ 72) _____

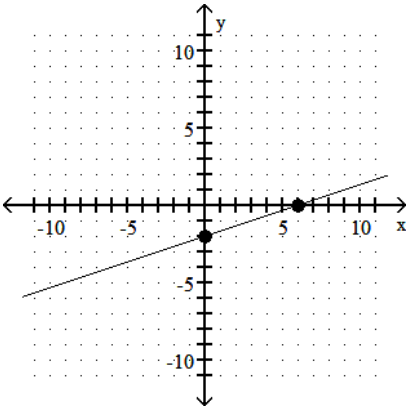


1) $\{-25\}$
2) $\left\{\frac{5}{3}\right\}$
3) $\{37\}$
4) shorter piece: 1 ft.; longer piece: 8 ft.
5) $5x^2 - 8x - 14$
6) $-6x^6 + 2x^3 - 1$
7) $-36x^{10}$
8) $7x^3 - 15x^2 + 9x - 1$
9) $9x^2 - 66x + 121$
10) $5x^2 + 2x + 3 + \frac{14}{5x - 1}$
11) $-2x^2(x^2 + 7x - 5)$
12) $(x + 4)(x + 5)$
13) $(x + 10)(x - 3)$
14) $(3x + 2)(x + 5)$
15) $(6x + 7)(6x - 7)$
16) $\{-10, 6\}$
17) $\frac{x - 3}{x - 4}$
18) $\frac{4x}{3x + 2}$
19) $\frac{5}{(y - 3)(y + 1)}$
20) $\frac{x}{x - 2}$
21) $\frac{x^2 - 3x + 28}{(x + 7)(x - 7)}$
22) $\frac{3}{y + 1}$
23) $\frac{4y - 3x}{3y + 5x}$
24) $\{16\}$
25) $\{1\}$
26) domain = $\{4, -5, 10\}$; range = $\{5, -3, -8, 2\}$
27) not a function
28) function
29) $\{x \mid -7 \le x < 3\}$

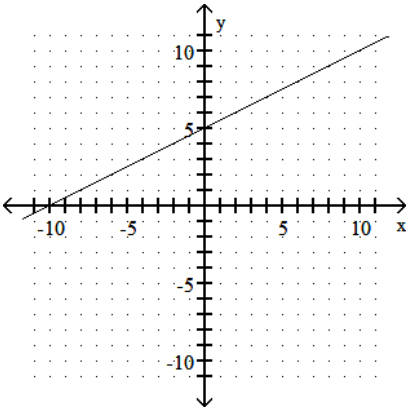


30) function
31) 4
32) 12
33) $5a - 8$
34) does not have an inverse
35) $f^{-1}(x) = \frac{x - 7}{8}$
36) $f^{-1}(x) = -\frac{1}{11}x$
37) b^2
38) $\sqrt[3]{x^2}$
39) $8\sqrt{5x}$
40) $2x\sqrt{3x}$
41) $2x^4y^4\sqrt[3]{2x^2}$
42) $-22\sqrt{3}$
43) $4x\sqrt{5}$
44) $2x\sqrt[3]{x}$
45) $\{5\}$
46) $\frac{3\sqrt{2x}}{2}$
47) $\frac{40 + 5\sqrt{5}}{59}$
48) 45 mph
49) $\{\pm 4\}$
50) $\{-7 \pm \sqrt{10}\}$
51) $\{-5 \pm \sqrt{19}\}$
52) $\left\{\frac{8}{5}, -1\right\}$
53) 5.5 sec
54) \$632
55) 623 rabbits
56) \$10,000 invested at 6.25% compounded continuously over 7 years yields the greater return.
57) $5^3 = 125$
58) $\log_{125}5 = \frac{1}{3}$
59) 1
60) 0
61) $\ln\left(\frac{7}{x^5}\right)$
62) $\log(x^5y^2)$
63) $2 + 5\log_{10}x$
64) $\{2\}$
65) $\{5\}$

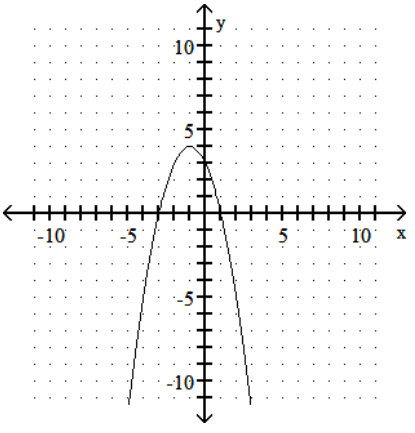
66) (0, -2); (6, 0)



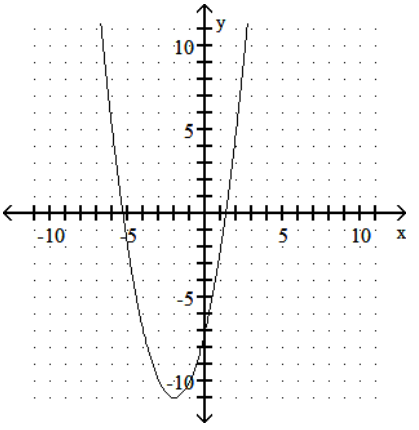
67)



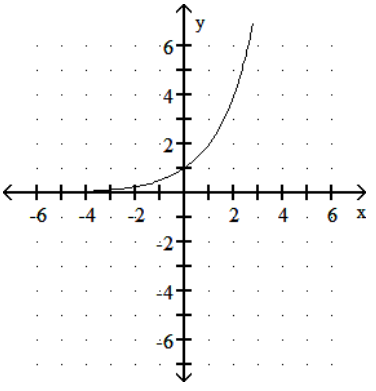
68) vertex: (- 1, 4)
axis of symmetry: x = - 1



69) vertex: (-2, -11)
x-intercepts: $(-2 \pm \sqrt{11}, 0)$
y-intercept: (0, -7)
axis of symmetry: x = -2



70)



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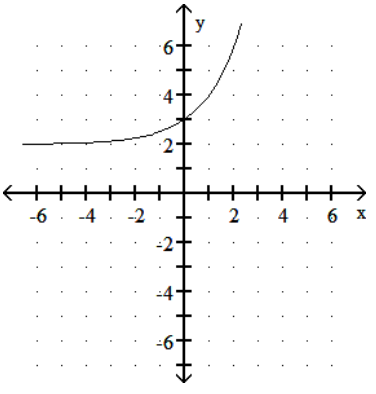

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