Math 90 Fall 2009 Final Exam Review

Name_____
Class Time _____

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Apply the quotient rule for exponents, if applicable, and write the result using only positive exponents. Assume all variables represent nonzero numbers.**

1) $\frac{x^{-2}}{x^{-14}}$ 1) _____

A) $x^{12}$ B) $\frac{1}{x^{16}}$ C) $-x^{12}$ D) $\frac{1}{x^{12}}$

**Use the order of operations to simplify the expression.**

2) $\frac{5(2+1)-7(1+1)}{5(4-2)-2^3}$ 2) _____

A) 4 B) $\frac{1}{8}$ C) $\frac{1}{6}$ D) $\frac{1}{2}$

**Solve the formula for the specified variable.**

3) $F = \frac{9}{5}C + 32$ for C 3) _____

A) $C = \frac{9}{5}(F - 32)$ B) $C = \frac{F - 32}{9}$ C) $C = \frac{5}{F - 32}$ D) $C = \frac{5}{9}(F - 32)$

4) $A = P(1 + nr)$ for r 4) _____

A) $r = \frac{A - P}{Pn}$ B) $r = \frac{Pn}{A - P}$ C) $r = \frac{P - A}{Pn}$ D) $r = \frac{A}{n}$

**Decide whether the equation is conditional, an identity, or a contradiction. Give the solution set.**

5) $21m + 9 = 3(4m + 12)$ 5) _____

A) Contradiction; ∅
B) Conditional; {–5}
C) Conditional; {3}
D) Identity; {all real numbers}

6) $20k + 47 = 4(5k + 10)$ 6) _____

A) Conditional; {–5}
B) Identity; {all real numbers}
C) Contradiction; ∅
D) Conditional; {5}

7) $5x + 6(x + 1) + 4 = 10 - 8x$ 7) _____

A) Conditional; {1}
B) Identity; {all real numbers}
C) Conditional; {0}
D) Contradiction; ∅

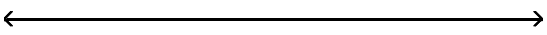
**Solve the equation.**

8) $\left| 8 + \frac{1}{9}x \right| = 4$ 8) _____

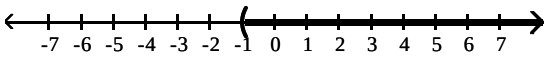
A) {36, 108} B) {–108, –36} C) ∅ D) [108, –36}

**For the compound inequality, give the solution set in both interval and graph forms.**

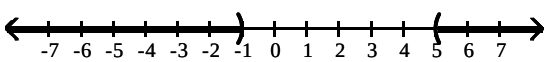
9) $x - 2 > 3$ or $x + 2 < 1$ 9) _____



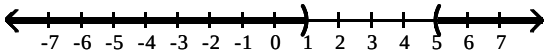
A) (–1, ∞)



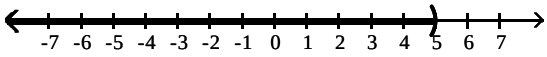

B) (–∞, –1) ∪ (5, ∞)




C) (–∞, 1) ∪ (5, ∞)

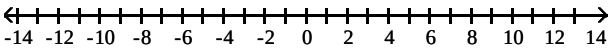



D) (–∞, 5)

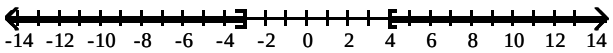



**Solve the inequality and graph the solution set.**

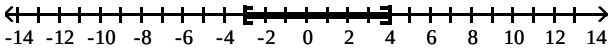
10) $|2x - 1| \geq 7$ 10) _____



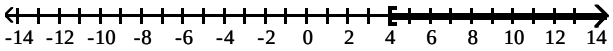

A) $(-\infty, -3] \cup [4, \infty)$



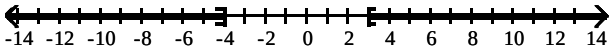

B) $[-3, 4]$



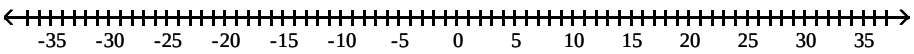

C) $[4, \infty)$



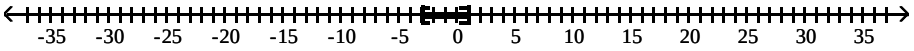

D) $(-\infty, -4] \cup [3, \infty)$



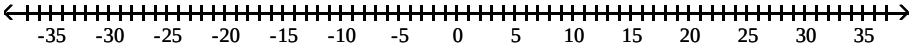
11) $|h - 4| \le 7$ 11) _____



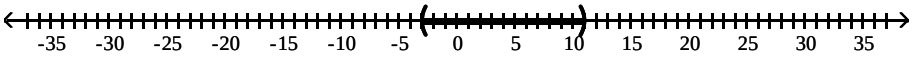

A) [−3, 1]



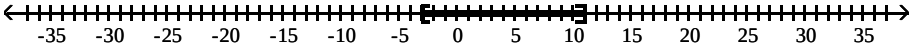

B) ∅




C) (−3, 11)




D) [−3, 11]




**Solve the absolute value equation.**

12) $|7k + 8| + 7 = 12$ 12) _____

A) $(-\infty, \infty)$ B) $\left\{-\frac{13}{7}, -\frac{3}{7}\right\}$ C) $\left\{-\frac{7}{3}, -\frac{7}{13}\right\}$ D) ∅

**Solve the mixture problem.**

13) How many liters of a 30% alcohol solution must be mixed with 80 liters of a 80% solution to get a 70% solution? 13) _____

A) 2 liters B) 20 liters C) 10 liters D) 100 liters

14) In a chemistry class, 8 liters of a 4% silver iodide solution must be mixed with a 10% solution to get a 6% solution. How many liters of the 10% solution are needed? 14) _____

A) 5 liters B) 3 liters C) 4 liters D) 8 liters

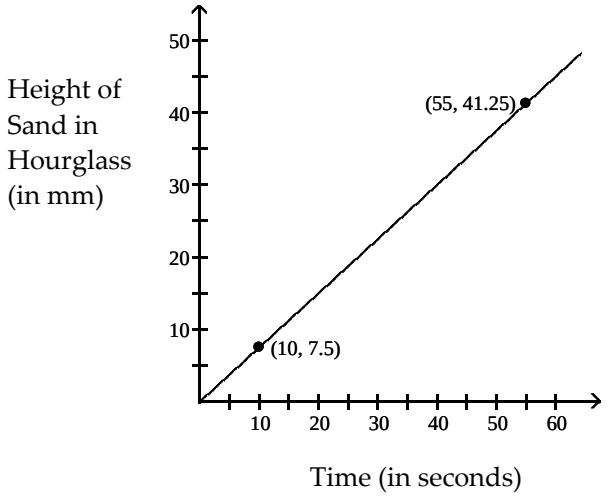
**Solve the problem.**

15) A woman has $1.70 in dimes and nickels. She has 5 more dimes than nickels. How many nickels does she have? 15) _____

A) 18 B) 8 C) 3 D) 13

**Find the average rate of change illustrated in the graph.**

16) 16) _____




A) 1.3 mm per second
B) .75 mm per second
C) .85 mm per second
D) 1 mm per second

**Find an equation of the line, and write it in (a) slope–intercept form if possible and (b) standard form.**

17) Through (7, 0) and (−4, 5) 17) _____

A) (a) $y = -\frac{5}{11}x + \frac{35}{11}$
(b) $5x + 11y = 35$

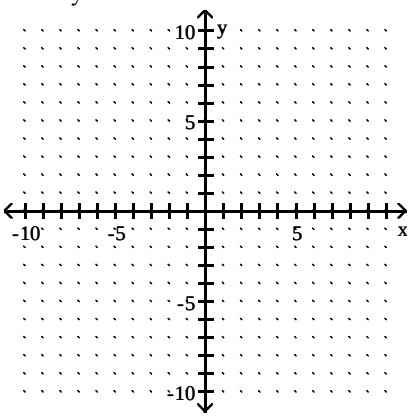
B) (a) $y = \frac{7}{9}x + \frac{17}{9}$
(b) $7x - 9y = -17$

C) (a) $y = \frac{5}{11}x + \frac{35}{11}$
(b) $-5x + 11y = 35$

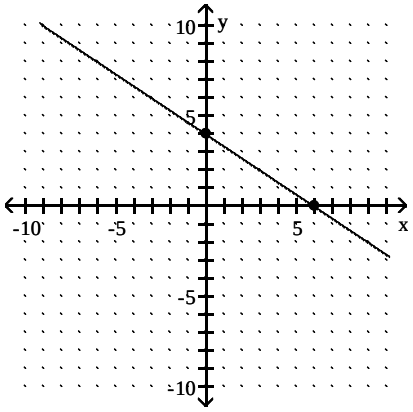
D) (a) $y = -\frac{7}{9}x + \frac{17}{9}$
(b) $-7x - 9y = -17$

**Find the x– and y–intercepts, and graph the equation.**

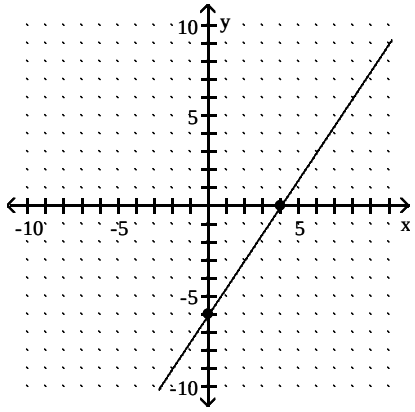
18) $4x - 6y = -24$ 18) _____



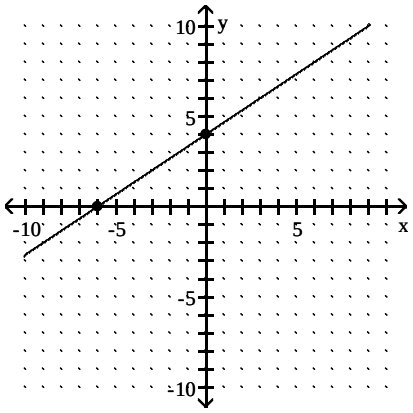

A) (0, 4), (6, 0)



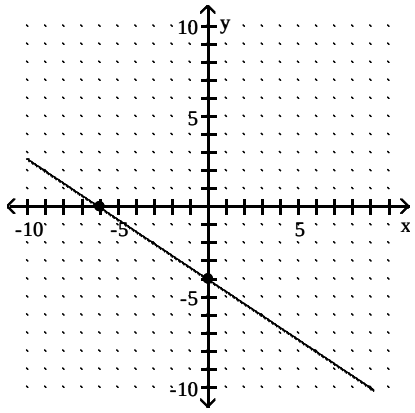

B) (0, –6), (4, 0)




C) (0, 4), (–6, 0)




D) (0, –4), (–6, 0)




**Find an equation of the line satisfying the conditions. Write the equation in slope–intercept form.**

19) Through (–6, 5); parallel to $-7x + 5y = 57$ 19) _____

A) $y = -\frac{5}{7}x - \frac{30}{7}$ B) $y = -\frac{7}{5}x - \frac{67}{5}$ C) $y = \frac{7}{5}x + \frac{67}{5}$ D) $y = \frac{5}{7}x + \frac{30}{7}$

20) Through (–3, 8); perpendicular to $-3x + 4y = -23$ 20) _____

A) $y = \frac{3}{4}x + \frac{41}{4}$ B) $y = -\frac{3}{4}x + \frac{23}{4}$ C) $y = -\frac{4}{3}x + 4$ D) $y = \frac{4}{3}x + 12$

**Solve the system. If the system is inconsistent or has dependent equations, say so.**

21) $x = -13 + 3y$
$8x - 4y = 16$ 21) _____

A) {(5, 6)}
B) {(−5, 7)}
C) {(4, 7)}
D) ∅; inconsistent system

22) $x + y = 6$
$5x + 5y = 30$ 22) _____

A) {(0, 0)}
B) {(9, −3)}
C) {(x, y)| $x + y = 6$}; dependent equations
D) ∅; inconsistent system

**Solve the system by elimination. If the system is inconsistent or has dependent equations, say so.**

23) $2x - 3y = -2$
$6x - 9y = 6$ 23) _____

A) {(−1, 0)}
B) {(5, −4)}
C) {(x, y) | $2x - 3y = -2$}; dependent equations
D) ∅; inconsistent system

**Find the equation in slope–intercept form of the line satisfying the conditions.**

24) m = 2, passes through (5, −6) 24) _____

A) $y = 2x - 16$
B) $y = 2x + 15$
C) $y = 2x - 14$
D) $y = 3x + 17$

**Solve the problem.**

25) Find f(3) when $f(x) = 4x^2 + 4x + 7$. 25) _____

A) 28
B) 55
C) 41
D) 31

26) Find f(k − 1) when $f(x) = 4x^2 - 4x + 6$. 26) _____

A) $-12k^2 + 4k + 14$
B) $4k^2 + 20k + 6$
C) $4k^2 - 12k + 14$
D) $4k^2 - 12k + 6$

**Find the product.**

27) $(2x - 9)(x + 10)$ 27) _____

A) $x^2 - 90x + 11$
B) $2x^2 + 11x - 90$
C) $x^2 + 11x + 2$
D) $2x^2 + 2x - 90$

**Divide.**

28) $\dfrac{x^2 - 12x + 35}{x - 7}$ 28) _____

A) $x + 5$
B) $x - 5$
C) $5 - x$
D) $x + 7$

**Add or subtract as indicated.**

29) $(7n^7 + 6n - 8n^4) + (4n^4 + 4n^7 - 4n)$ 29) _____

A) $11n^7 - 4n^4 + 2n$
B) $11n - 4n^7 + 2n^4$
C) $10n^7 + 11n^4 - 12n$
D) $9n^{12}$

**Factor by grouping.**

30) $x^3 + 3x^2 + 5x + 15$ 30) _____

A) $(x + 3x)(x^2 + 5)$
B) $(x + 3)(x^2 + 5)$
C) $(x - 3)(x^3 + 5)$
D) $(x + 5)(x^2 + 3)$

**Factor the trinomial completely.**

31) $12y^2 + 25y + 12$ 31) _____

A) $(4y - 3)(3y - 4)$
B) $(12y + 3)(y + 4)$
C) $(12y + 1)(y - 12)$
D) $(4y + 3)(3y + 4)$

**Factor the polynomial completely.**

32) $125a^3 - 64b^3$ 32) _____

A) $(5a - 4b)(25a^2 + 20ab + 16b^2)$
B) $(5a + 4b^2)(25a^2 - 20ab + 16b^2)$
C) $(5a - 4b)(25a^2 + 16b^2)$
D) $(125a - 4b)(a^2 + 20ab + 16b^2)$

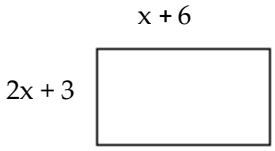
**Solve the equation.**

33) $(7y + 23)(3y + 5) = 0$ 33) _____

A) $\left\{-\frac{23}{7}, -\frac{5}{3}\right\}$ B) $\left\{\frac{23}{7}, \frac{5}{3}\right\}$ C) $\left\{-\frac{7}{16}, -\frac{3}{5}\right\}$ D) {16, 2}

**Solve the problem.**

34) The area of the rectangle shown is 35 in.$^2$. Find the length and the width of the rectangle. 34) _____




A) length: 7 in.; width 5 in. B) length: 17 in.; width 1 in.
C) length: 17.5 in.; width 17.5 in. D) length: 8 in.; width 4 in.

**Find all numbers not in the domain of the function.**

35) $f(x) = \frac{x^2 - 49}{x^2 + 2x - 24}$ 35) _____

A) 0 B) 7, −7 C) −6, 4 D) 6, −4

**Find the domain of the rational function.**

36) $f(x) = \dfrac{x - 1}{6x + 9}$ 36) _____

A) $\left\{x \mid x \neq -\dfrac{3}{2}, 1\right\}$ B) $\left\{x \mid x \neq -\dfrac{3}{2}\right\}$ C) $\left\{x \mid x \neq \dfrac{3}{2}\right\}$ D) $(-\infty, \infty)$

**Add or subtract as indicated. Write the answer in lowest terms.**

37) $\dfrac{x}{x^2 - 16} - \dfrac{5}{x^2 + 5x + 4}$ 37) _____

A) $\dfrac{x^2 - 4x + 20}{(x - 4)(x + 4)}$ B) $\dfrac{x^2 + 4x + 20}{(x - 4)(x + 4)(x + 1)}$

C) $\dfrac{x^2 - 4x + 20}{(x - 4)(x + 4)(x + 1)}$ D) $\dfrac{x^2 - 4}{(x - 4)(x + 4)(x + 1)}$

**Perform the indicated operation and express in lowest terms.**

38) $\dfrac{k^2 + 5k + 6}{k^2 + 11k + 24} \cdot \dfrac{k^2 + 8k}{k^2 - 3k - 10}$ 38) _____

A) $\dfrac{k^2 + 8k}{k - 5}$ B) $\dfrac{1}{k - 5}$ C) $\dfrac{k}{k - 5}$ D) $\dfrac{k}{k^2 + 11k + 24}$

**Simplify the complex fraction.**

39) $\dfrac{4+\dfrac{2}{x}}{\dfrac{x}{3}+\dfrac{1}{6}}$ 39) _____

A) 12 B) 1 C) $\dfrac{x}{12}$ D) $\dfrac{12}{x}$

**Without actually solving the equation, list all possible numbers that would have to be rejected if they appeared as potential solutions.**

40) $\dfrac{4}{6x+13}-\dfrac{1}{x}=\dfrac{1}{13x-9}$ 40) _____

A) $-\dfrac{13}{6}, \dfrac{9}{13}, -4$ B) $0, -\dfrac{13}{6}, \dfrac{9}{13}$ C) $-\dfrac{13}{6}, \dfrac{9}{13}$ D) $0, \dfrac{13}{6}, -\dfrac{9}{13}$

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Solve the equation.**

41) $\dfrac{x}{2x+2}=\dfrac{-2x}{4x+4}+\dfrac{2x-3}{x+1}$ 41) _____

**Solve the problem.**

42) If an object is projected upward with an initial velocity of 32 ft per sec from a height h of 128 ft, then its height t sec after it is projected is defined by the equation $h = -16t^2 + 32t + 128$.
How many sec after it is projected will it hit the ground? 42) _____

**Divide.**

43) $\dfrac{x^2 - 64}{x^2 - 6x + 9} \div \dfrac{8x - 64}{x^2 - 8x + 15}$ 43) _____

**Solve.**

44) The speed of a stream is 4 mph. If a boat travels 44 miles downstream in the same time that it takes to travel 22 miles upstream, what is the speed of the boat in still water? 44) _____

**Solve the equation.**

45) $\frac{2y + 3}{y} = \frac{3}{2}$ 45) _____

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Please provide the domain and range of the function.**

46) $f(x) = \sqrt{x + 6}$ 46) _____

A) $[0, \infty)$; $[-6, \infty)$ B) $[-6, \infty)$; $[0, \infty)$ C) $[6, \infty)$; $[0, \infty)$ D) $[0, \infty)$; $[6, \infty)$

**Simplify the expression. Assume that all variables represent positive real numbers.**

47) $\left(\frac{4}{25}\right)^{-3/2}$ 47) _____

A) $\frac{125}{8}$ B) $\frac{8}{125}$ C) $\frac{25}{4}$ D) $\frac{4}{25}$

**Simplify by first converting to rational exponents. Assume that all variables represent positive real numbers.**

48) $\sqrt{z^{12}}$ 48) _____

A) $z^6$ B) $z^{24}$ C) $2z$ D) $\frac{z}{2}$

**Express the radical in simplified form. Assume that all variables represent positive real numbers.**

49) $-\sqrt{8k^7q^8}$ 49) _____

A) $-2k^3q^4\sqrt{2k}$ B) $-2k^3q^4\sqrt{2}$ C) $2k^7q^8\sqrt{2k}$ D) $2k^3q^4\sqrt{2k}$

**Simplify. Assume that all variables represent positive real numbers.**

50) $-3\sqrt{7} + 5\sqrt{28}$ 50) _____

A) $-7\sqrt{7}$ B) $7\sqrt{7}$ C) $13\sqrt{7}$ D) $2\sqrt{7}$

**Multiply, then simplify the product. Assume that all variables represent positive real numbers.**

51) $(2 - 3\sqrt{2})^2$ 51) _____

A) $22 - 12\sqrt{2}$ B) $4 + 9\sqrt{2}$ C) $22 + 12\sqrt{2}$ D) $4 - 9\sqrt{2}$

**Rationalize the denominator. Assume that all variables represent positive real numbers.**

52) $\dfrac{5\sqrt{11x}}{\sqrt{x^3}}$ 52) _____

A) $5x\sqrt{11}$ B) $\dfrac{5\sqrt{11}}{x}$ C) $\dfrac{55}{x}$ D) $\dfrac{5\sqrt{11x}}{x}$

**Solve this equation.**

53) $\sqrt{x + 7} + 5 = x$ 53) _____

A) {9, 18} B) {2} C) {2, 9} D) {9}

**Use the quadratic formula to solve the equation.**

54) $8x^2 + 9x + 3 = 0$ 54) _____

A) $\left\{\dfrac{9 + i\sqrt{15}}{16}, \dfrac{9 - i\sqrt{15}}{16}\right\}$

B) $\left\{\dfrac{-9 + i\sqrt{15}}{16}, \dfrac{-9 - i\sqrt{15}}{16}\right\}$

C) $\left\{\dfrac{9 + \sqrt{15}}{16}, \dfrac{9 - \sqrt{15}}{16}\right\}$

D) $\left\{\dfrac{-9 + \sqrt{15}}{16}, \dfrac{-9 - \sqrt{15}}{16}\right\}$

**Perform the indicated operation. Write the answer in the form a + bi.**

55) $\frac{13 + i}{1 - i}$ 55) _____

A) 6 + 14i B) 6 + 6i C) 7 + 7i D) 6 + 7i

**Use the square root property to solve the equation.**

56) $(p - 7)^2 = 5$ 56) _____

A) $\{\sqrt{5} - 7, -\sqrt{5 - 7}\}$ B) $\{7 + \sqrt{5}, 7 - \sqrt{5}\}$
C) $\{\sqrt{5} - \sqrt{-7}\}$ D) $\{7 + \sqrt{5}\}$

**Solve the equation by completing the square.**

57) $7x^2 + 12x = -2$ 57) _____

A) $\left\{\frac{-12 + \sqrt{22}}{7}, \frac{-12 - \sqrt{22}}{7}\right\}$ B) $\left\{\frac{-6 + \sqrt{22}}{7}, \frac{-6 - \sqrt{22}}{7}\right\}$
C) $\left\{\frac{-6 + \sqrt{22}}{14}, \frac{-6 - \sqrt{22}}{14}\right\}$ D) $\left\{\frac{-6 + \sqrt{2}}{7}, \frac{-6 - \sqrt{2}}{7}\right\}$

**Simplify.**

58) $i^{13}$ 58) _____

A) i B) –i C) –1 D) 1

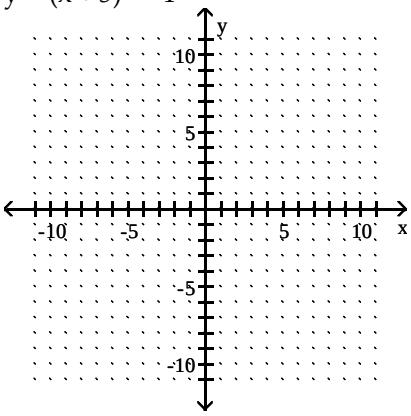
**Identify the vertex of the given parabola.**

59) $f(x) = -(x + 7)^2 - 4$ 59) _____

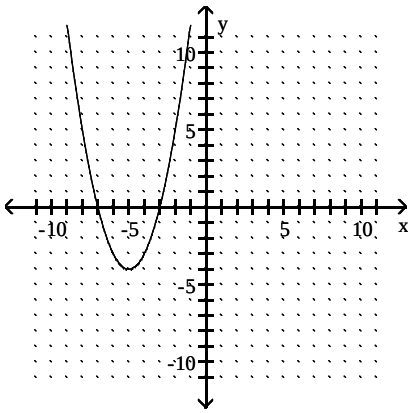
A) (–7, 4) B) (7, –4) C) (7, 4) D) (–7, –4)

**Sketch the graph of the parabola.**

60) $y = (x + 5)^2 - 4$ 60) _____




A)

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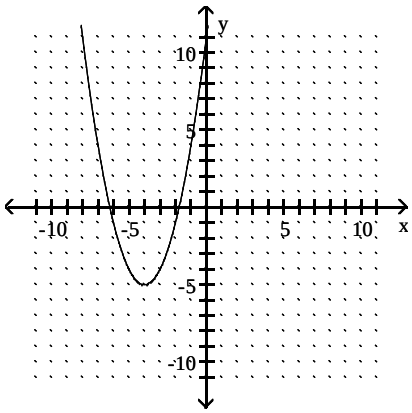


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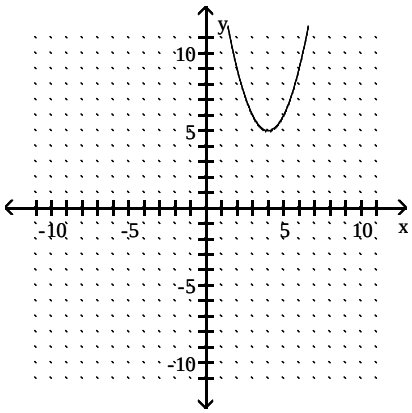
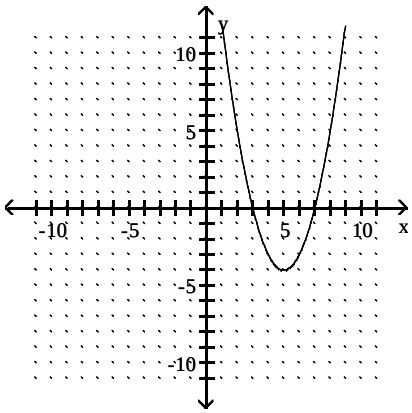



D)



**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Solve the problem.**

61) A jet plane traveling at a constant speed goes 1000 miles with the wind, then turns around and travels for 800 miles against the wind. If the speed of the wind is 50 mph and the total flight took 4 hours, find the speed of the plane in still air. 61) _____

62) Ron can mow the lawn in two hours more time than Paul. Working together they can mow the lawn in 4 hours. How long does it take each of them working alone? Round your answers to the nearest tenth of an hour, if necessary. 62) _____

63) A projectile is thrown upward so that its distance (in feet) above the ground after t seconds is given by $h(t) = -12t^2 + 456t$. What is its maximum height? 63) _____

**Solve the equation.**

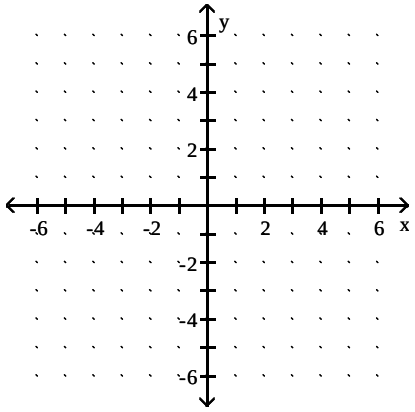
64) $\frac{12}{x-4} = 1 + \frac{14}{x+4}$ 64) _____

65) $x^4 + 8x^2 - 9 = 0$ 65) _____

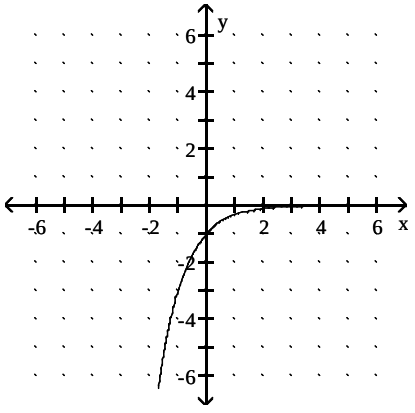
**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Graph the function.**

66) $f(x) = 3^x$ 66) _____




A)

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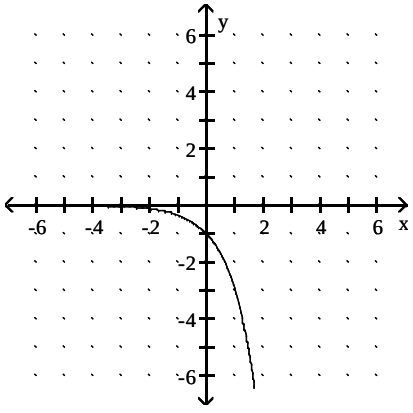

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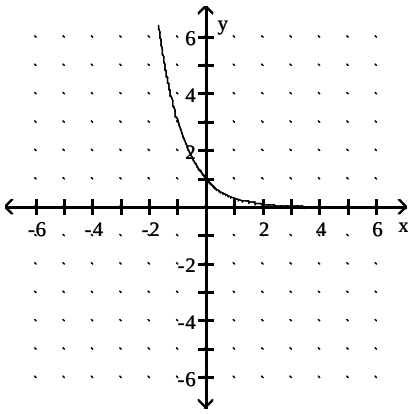
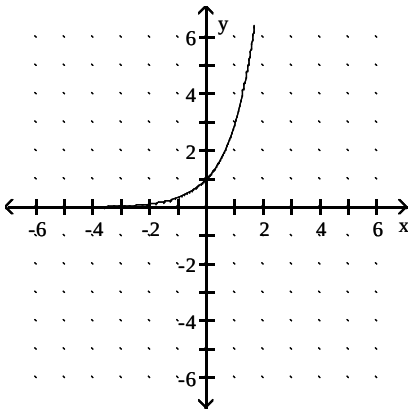
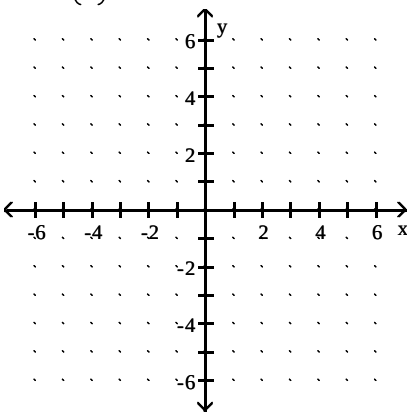


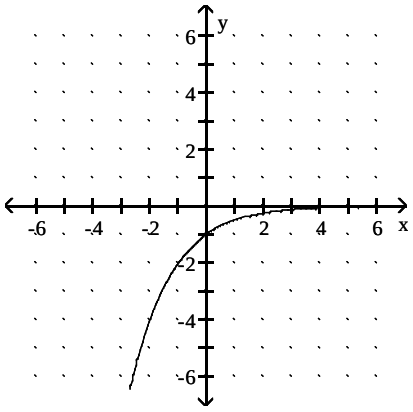

D)




67) $f(x) = \left(\frac{1}{2}\right)^x$ 67) _____




A)

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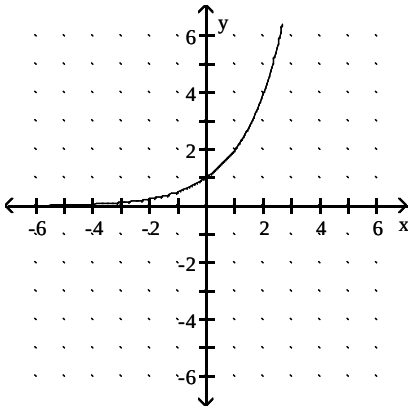
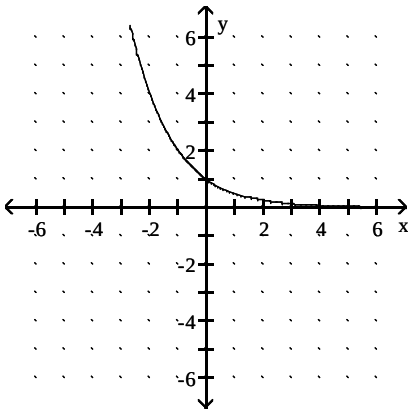
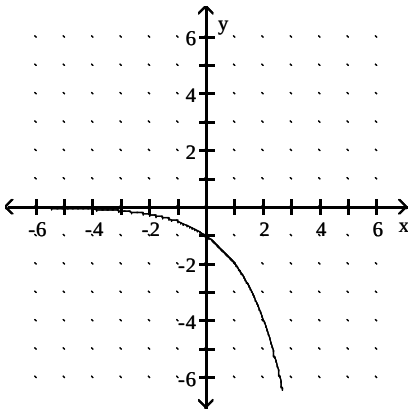


C)




D)




**Evaluate the logarithm.**

68) $\log_9\left(\frac{1}{81}\right)$ 68) _____

A) 9 B) –2 C) –9 D) 2

69) $\log_8 32$ 69) _____

A) $\frac{4}{3}$ B) $\frac{5}{4}$ C) $\frac{3}{2}$ D) $\frac{5}{3}$

**Express as a product.**

70) $\log_{10} \sqrt[7]{5}$ 70) _____

A) $10 \log_7 5$ B) $\log_{70} 5$ C) $\frac{1}{7} \log_{10} 5$ D) $\frac{1}{7} \log_{10} 5^7$

**Solve the problem.**

71) Find the amount of money in an account after 9 years if \$3200 is deposited at 8% annual interest compounded quarterly. 71) _____

A) \$6558.50 B) \$6527.64 C) \$6396.81 D) \$6482.61

72) A sample of 600 grams of radioactive substance decays according to the function $A(t) = 600e^{-0.049t}$, where t is the time in years. How much of the substance will be left in the sample after 10 years? Round your answer to the nearest whole gram. 72) _____

A) 1 g B) 38 g C) 0 g D) 368 g

73) The population of a small country increases according to the function $B = 1{,}400{,}000e^{0.03t}$, where t is measured in years. How many people will the country have after 4 years? 73) _____

A) 1,845,559 B) 1,289,146 C) 2,968,369 D) 1,578,496

**Solve the equation.**

74) $\log_6 (5x - 4) = 3$ 74) _____

A) $\left\{\frac{220}{7}\right\}$ B) $\{44\}$ C) $\{215\}$ D) $\emptyset$

75) $\log_6 (8x - 2) = 1$ 75) _____

A) $\{1\}$ B) $\{0\}$ C) $\left\{\frac{8}{3}\right\}$ D) $\varnothing$

1) A
2) D
3) D
4) A
5) C
6) C
7) C
8) B
9) B
10) A
11) D
12) B
13) B
14) C
15) B
16) B
17) A
18) C
19) C
20) C
21) A
22) C
23) D
24) A
25) B
26) C
27) B
28) B
29) A
30) B
31) D
32) A
33) A
34) A
35) C
36) B
37) C
38) C
39) D
40) B
41) {3}
42) 4 sec
43) $\frac{(x + 8)(x - 5)}{8(x - 3)}$
44) 12 mph
45) {−6}
46) B
47) A

48) A
49) A
50) B
51) A
52) B
53) D
54) B
55) D
56) B
57) B
58) A
59) D
60) A
61) 450 mph
62) Paul: 7.1 hr
    Ron: 9.1 hr
63) 4332 ft
64) {10, –12}
65) {1, –1, 3i, –3i}
66) D
67) C
68) B
69) D
70) C
71) B
72) D
73) D
74) B
75) A