

**Solve the system by the substitution method. If there is no solution or an infinite number of solutions, so state. Use set notation to express the solution set.**

$$1) \begin{cases} x - 5y = 14 \\ 3x - 6y = 15 \end{cases} \quad 1) \underline{\hspace{2cm}}$$

$$2) \begin{cases} 4x + y = 11 \\ 16x + 4y = 44 \end{cases} \quad 2) \underline{\hspace{2cm}}$$

**Solve the problem.**

3) One number is 3 less than a second number. Twice the second number is 21 more than 3 times the first. Find the two numbers. 3) \_\_\_\_\_

4) A tour group split into two groups when waiting in line for food at a fast food counter. The first group bought 8 slices of pizza and 5 soft drinks for \$30.33. The second group bought 7 slices of pizza and 6 soft drinks for \$28.96. How much does one slice of pizza cost? 4) \_\_\_\_\_

**Solve the system by the addition method. If there is no solution or an infinite number of solutions, so state. Use set notation to express the solution set.**

$$5) \begin{cases} x + y = 1 \\ x + y = -3 \end{cases} \quad 5) \underline{\hspace{2cm}}$$

$$6) \begin{cases} 7x + 6y = 34 \\ 5x - 4y = -42 \end{cases} \quad 6) \underline{\hspace{2cm}}$$

**Solve the problem.**

7) Devon purchased tickets to an air show for 8 adults and 2 children. The total cost was \$210. The cost of a child's ticket was \$5 less than the cost of an adult's ticket. Find the price of an adult's ticket and a child's ticket. 7) \_\_\_\_\_

8) How much pure acid should be mixed with 5 gallons of a 50% acid solution in order to get an 80% acid solution? 8) \_\_\_\_\_

9) The owners of a candy store want to sell, for \$6 per pound, a mixture of chocolate-covered raisins, which usually sells for \$3 per pound, and chocolate-covered macadamia nuts, which usually sells for \$8 per pound. They have a 60-pound barrel of the raisins. How many pounds of the nuts should they mix with the barrel of raisins so that they hit their target value of \$6 per pound for the mixture? 9) \_\_\_\_\_

10) Julie and Eric row their boat (at a constant speed) 63 miles downstream for 7 hours, helped by the current. Rowing at the same rate, the trip back against the current takes 9 hours. Find the rate of the current. 10) \_\_\_\_\_

**Solve the system. If there is no solution or if the system's equations are dependent, so state.**

$$11) \begin{cases} x + y + z = 8 \\ x - y + 2z = 3 \\ 5x + y + z = 0 \end{cases} \quad 11) \underline{\hspace{2cm}}$$

$$12) \begin{cases} x + y + z = -4 \\ x - y - 4z = 1 \\ 3x + 3y + 3z = -12 \end{cases}$$

12) \_\_\_\_\_

**Find the domain and range.**

13)  $\{(9,3), (9,-7), (5,8), (-10,7), (-6,-6)\}$

13) \_\_\_\_\_

**Decide whether the relation is a function.**

14)  $\{(-4, 4), (-1, 2), (4, 9), (4, 7)\}$

14) \_\_\_\_\_

**Find the indicated function value.**

15) Find  $f(-4)$  when  $f(x) = \frac{x^3 + 4}{x^2 + 2}$ .

15) \_\_\_\_\_

16)

x	f(x)
-4	-1
-3	3
0	15
3	27
4	31

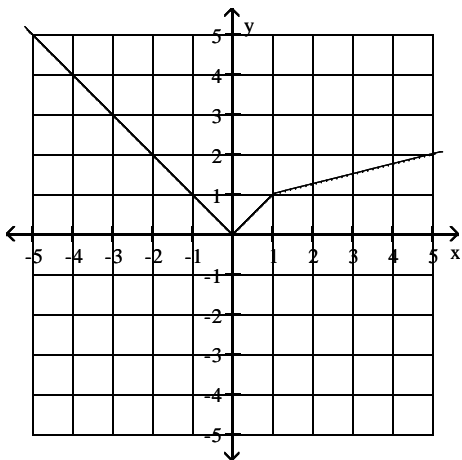
Find  $f(3)$

16) \_\_\_\_\_

**Use the graph to find the indicated function value.**

17)  $y = f(x)$ . Find  $f(-2)$ .

17) \_\_\_\_\_



**Find the domain of the function.**

18)  $f(x) = \frac{1}{x+3}$

18) \_\_\_\_\_

**Find the indicated function value.**

19)  $f(x) = 4x - 4$ ,  $g(x) = -3x - 4$   
Find  $(f + g)(-5)$ .

19) \_\_\_\_\_

**Find the requested value.**

20)  $f(x) = -3x^2 - 7$ ,  $g(x) = x + 4$   
Find  $(f - g)(-3)$ .

20) \_\_\_\_\_

**Find the composition.**

21) If  $f(x) = 7x^2 + 5x$  and  $g(x) = 3x$ , find  $(f \circ g)(x)$ .

21) \_\_\_\_\_

22) If  $f(x) = 6x + 5$  and  $g(x) = x + 4$ , find  $(g \circ f)(x)$ .

22) \_\_\_\_\_

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

23)  $f(x) = 8x - 7$

23) \_\_\_\_\_

**Find the function value indicated for the function. If necessary, round to two decimal places. If the function value is not a real number and does not exist, state so.**

24) Evaluate  $p(x) = -\sqrt{x + 11}$  for  $p(-2)$

24) \_\_\_\_\_

**Find the domain of the square root function. Graph of the function.**

25)  $f(x) = \sqrt{x - 2}$

25) \_\_\_\_\_

**Use radical notation to rewrite the expression. Simplify, if possible.**

26)  $(-8)^{1/3}$

26) \_\_\_\_\_

27)  $(-64)^{2/3}$

27) \_\_\_\_\_

28)  $32^{1/5} + 16^{1/4}$

28) \_\_\_\_\_

**Rewrite the expression with a positive rational exponent. Simplify, if possible.**

29)  $100^{-3/2}$

29) \_\_\_\_\_

**Simplify by factoring.**

30)  $\sqrt{600x}$

30) \_\_\_\_\_

31)  $\sqrt[3]{-27a^{11}b^{10}}$

31) \_\_\_\_\_

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

32)  $\sqrt{24xy} \cdot \sqrt{4xy^2}$

32) \_\_\_\_\_

**Add or subtract as indicated. You will need to simplify terms to identify like radicals.**

33)  $2\sqrt[3]{a} + \sqrt[3]{64a}$

33) \_\_\_\_\_

34)  $-5\sqrt{18} - 2\sqrt{8} - 3\sqrt{200}$

34) \_\_\_\_\_

**Multiply and simplify. Assume that all variables represent positive real numbers.**

35)  $(5 - \sqrt{x})(6 - \sqrt{x})$  35) \_\_\_\_\_

36)  $(9\sqrt{7} - 2)^2$  36) \_\_\_\_\_

**Rationalize the denominator and simplify.**

37)  $\frac{10x}{\sqrt[3]{2x^2}}$  37) \_\_\_\_\_

**Rationalize the denominator.**

38)  $\frac{\sqrt{7} + \sqrt{2}}{\sqrt{7} - \sqrt{2}}$  38) \_\_\_\_\_

**Solve the equation.**

39)  $\sqrt{x^2 - 2x + 64} = x + 6$  39) \_\_\_\_\_

40)  $\sqrt{2x + 3} - \sqrt{x + 1} = 1$  40) \_\_\_\_\_

**Find each product. Write the result in the form  $a + bi$ .**

41)  $3i(4 - 6i)$  41) \_\_\_\_\_

**Divide and simplify to the form  $a + bi$ .**

42)  $\frac{6 + 4i}{8 - 3i}$  42) \_\_\_\_\_

**Find each product. Write the result in the form  $a + bi$ .**

43)  $(9 + 4i)(7 - 5i)$  43) \_\_\_\_\_

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

44)  $7x^2 - 5 = 0$  44) \_\_\_\_\_

45)  $(x - 5)^2 = -81$  45) \_\_\_\_\_

**Complete the square for the binomial. Then factor the resulting perfect square trinomial.**

46)  $x^2 + \frac{4}{9}x$  46) \_\_\_\_\_

47)  $x^2 + 3x$  47) \_\_\_\_\_

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

48)  $x^2 + 12x + 17 = 0$  48) \_\_\_\_\_

Solve the formula for the specified variable. Assume all variables represent nonnegative numbers. If possible, simplify radicals and rationalize denominators.

49)  $V = \frac{s^2h}{3}$  for s 49) \_\_\_\_\_

Find the distance between the pair of points. Give an exact answer.

50) (5, 3) and (-2, -6) 50) \_\_\_\_\_

Use the quadratic formula to solve the equation.

51)  $x^2 + 7x + 7 = 0$  51) \_\_\_\_\_

52)  $4x^2 = -8x - 1$  52) \_\_\_\_\_

Solve the problem.

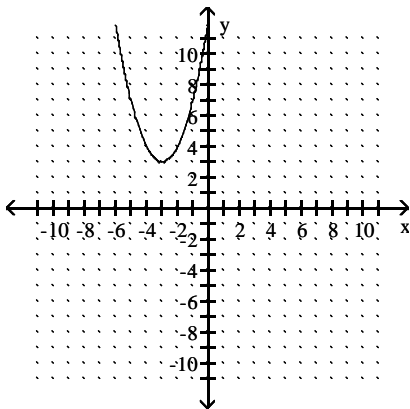
53) The length of a rectangular storage room is 10 feet longer than its width. If the area of the room is 75 square feet, find its dimensions. 53) \_\_\_\_\_

54) The area of a rectangular wall in a classroom is 198 square feet. Its length is 5 feet shorter than three times its width. Find the length and width of the wall of the classroom. 54) \_\_\_\_\_

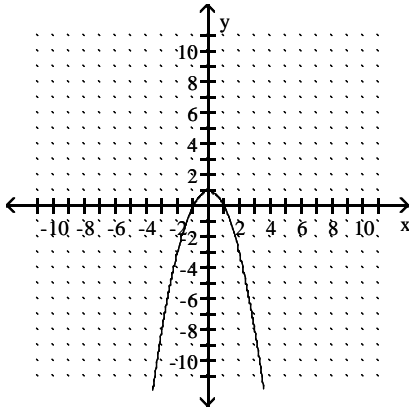
55) A ball is thrown downward with an initial velocity of 21 meters per second from a cliff that is 90 meters high. The height of the ball is given by the quadratic equation  $h = -4.9t^2 - 21t + 150$  where h is in meters and t is the time in seconds since the ball was thrown. Find the time that the ball will be 60 meters from the ground. Round your answer to the nearest tenth of a second. 55) \_\_\_\_\_

The graph of a quadratic function is given. Find the function's equation.

56) 56) \_\_\_\_\_



57)

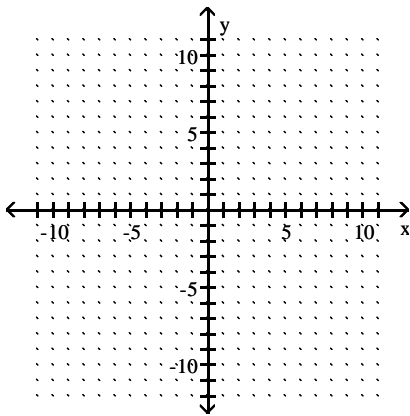


57) \_\_\_\_\_

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

58)  $f(x) = 4x^2 + 24x + 41$

58) \_\_\_\_\_



Determine whether the given quadratic function has a minimum value or maximum value. Then find the minimum or maximum value and determine where it occurs.

59)  $f(x) = -x^2 + 2x - 8$

59) \_\_\_\_\_

Solve the equation by making an appropriate substitution.

60)  $x^4 - 13x^2 + 36 = 0$

60) \_\_\_\_\_

61)  $(x - 1)^2 - 7(x - 1) + 10 = 0$

61) \_\_\_\_\_

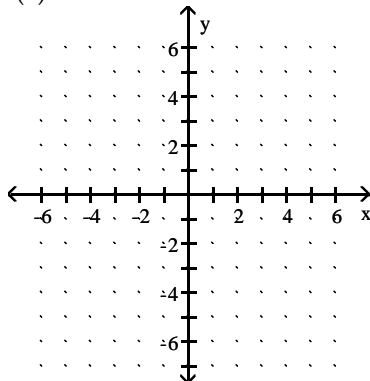
62)  $x^{-2} - 4x^{-1} + 3 = 0$

62) \_\_\_\_\_

Graph the function by making a table of coordinates.

63)  $f(x) = 5^x$

63) \_\_\_\_\_



Write the equation in its equivalent exponential form.

64)  $\log_2 32 = x$

64) \_\_\_\_\_

Write the equation in its equivalent logarithmic form.

65)  $13^2 = y$

65) \_\_\_\_\_

Evaluate the expression without using a calculator.

66)  $\log_7 \sqrt{7}$

66) \_\_\_\_\_

67)  $\log_{125} 5$

67) \_\_\_\_\_

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

68)  $\log_b(yz^8)$

68) \_\_\_\_\_

69)  $\log_b \left( \frac{xy^5}{z^6} \right)$

69) \_\_\_\_\_

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.

70)  $8 \ln x - \frac{1}{4} \ln y$

70) \_\_\_\_\_

71)  $2 \ln a - 9 \ln b$

71) \_\_\_\_\_

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

72)  $\log_6 3$

72) \_\_\_\_\_

Solve the equation by expressing each side as a power of the same base and then equating exponents.

73)  $3^x = \frac{1}{81}$

73) \_\_\_\_\_

74)  $2^{-x} = 8$

74) \_\_\_\_\_

75)  $3(1 + 2x) = 27$

75) \_\_\_\_\_

**Solve the logarithmic equation. Give an exact answer.**

76)  $\log_3 10 + \log_3 x = 1$

76) \_\_\_\_\_

77)  $\log_3(x + 2) - \log_3 x = 2$

77) \_\_\_\_\_

78)  $\ln 5 + \ln(x - 1) = 0$

78) \_\_\_\_\_

79)  $\log(5 + x) - \log(x - 4) = \log 2$

79) \_\_\_\_\_

**Solve the problem.**

80) The formula  $A = 121e^{0.031t}$  models the population of a particular city, in thousands,  $t$  years after 2011. When will the population of the city reach 150 thousand?

80) \_\_\_\_\_

**Solve.**

81) The value of a particular investment follows a pattern of exponential growth. You invested money in a money market account. The value of your investment  $t$  years after your initial investment is given by the exponential growth model  $A = 4300e^{0.049t}$ . When will the account be worth \$6683?

81) \_\_\_\_\_

**Write the standard form of the equation of the circle with the given center and radius.**

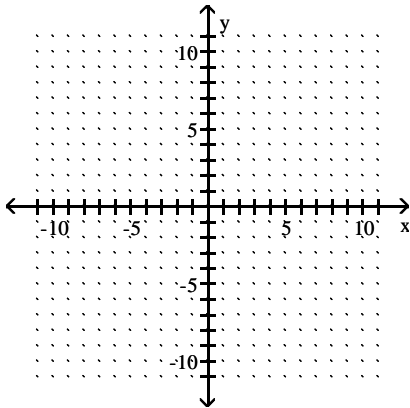
82) Center  $(-6, -2)$ ,  $r = 1$

82) \_\_\_\_\_

**Give the center and radius of the circle described by the equation and graph the equation.**

83)  $(x - 3)^2 + (y - 1)^2 = 25$

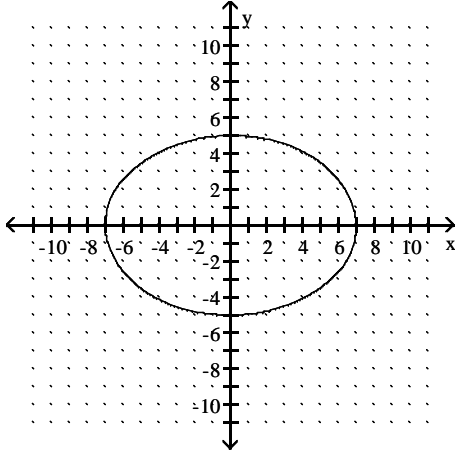
83) \_\_\_\_\_





Find the standard form of the equation of the ellipse.

84)



84) \_\_\_\_\_

Find the vertices of the hyperbola with the given equation.

85)  $\frac{x^2}{1} - \frac{y^2}{81} = 1$

85) \_\_\_\_\_

Determine whether the system is a nonlinear system or a linear system.

86)  $\begin{cases} 4x - y = 10 \\ x^2 = 5y + 11 \end{cases}$

86) \_\_\_\_\_

Solve the system by the substitution method.

87)  $\begin{cases} y = x + 2 \\ y^2 = 8x \end{cases}$

87) \_\_\_\_\_

Solve the system by the addition method.

88)  $\begin{cases} 3x^2 + y^2 = 9 \\ 3x^2 - y^2 = 9 \end{cases}$

88) \_\_\_\_\_

Write the first four terms of the sequence whose general term is given.

89)  $a_n = 4n - 1$

89) \_\_\_\_\_

90)  $a_n = (-4)^n$

90) \_\_\_\_\_

91)  $a_n = \frac{n^4}{(n-1)!}$

91) \_\_\_\_\_

Find the indicated sum.

92)  $\sum_{i=2}^5 (4i - 4)$

92) \_\_\_\_\_

93)  $\sum_{i=1}^4 2^i$

93) \_\_\_\_\_

Find the common difference for the arithmetic sequence.

94)  $8, 11, 14, 17, \dots$

94) \_\_\_\_\_

Write the first five terms of the arithmetic sequence with the given first term,  $a_1$ , and common difference,  $d$ .

95)  $a_1 = 4; d = 4$

95) \_\_\_\_\_

Find the common ratio for the geometric sequence.

96)  $1, -3, 9, -27, 81, \dots$

96) \_\_\_\_\_

Write the first four terms of the geometric sequence with the given first term,  $a_1$ , and common ratio,  $r$ .

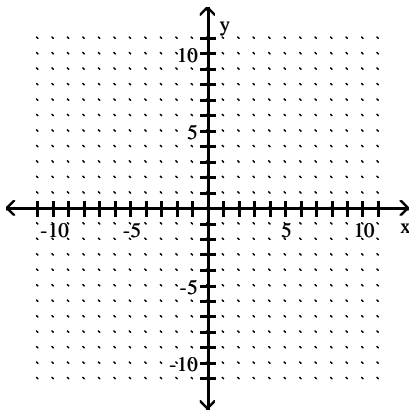
97)  $a_1 = 5; r = 2$

97) \_\_\_\_\_

Complete the square and write the equation in standard form. Then give the center and radius of the circle and graph the equation.

98)  $x^2 + y^2 - 6x - 8y - 11 = 0$

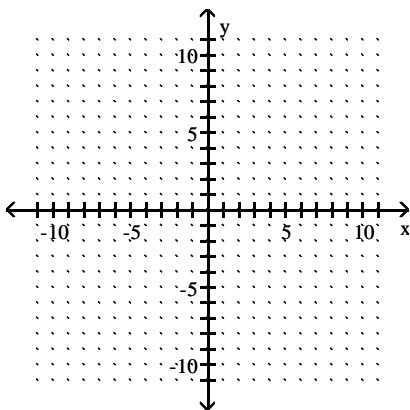
98) \_\_\_\_\_



Sketch the ellipse for the equation.

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

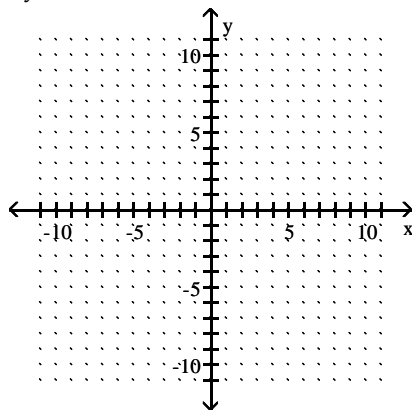
99) \_\_\_\_\_



Use vertices and asymptotes to graph the hyperbola.

100)  $9y^2 - 4x^2 = 36$

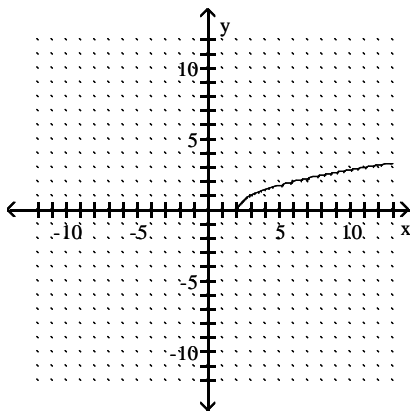
100) \_\_\_\_\_



## Answer Key

Testname: MATH 91 SAMPLE TEST NONMULTIPLE

- 1)  $\{(-1, -3)\}$
- 2) infinitely many solutions;  $\{(x, y) \mid 4x + y = 11\}$  or  $\{(x, y) \mid 16x + 4y = 44\}$
- 3) -15 and -12
- 4) \$2.86 per slice of pizza
- 5) no solution;  $\emptyset$
- 6)  $\{(-2, 8)\}$
- 7) adult's ticket: \$22; child's ticket: \$17
- 8) 7.5 gal
- 9) 90 pounds
- 10) 1 mph
- 11)  $\{(-2, 5, 5)\}$
- 12) no solution or  $\emptyset$
- 13) domain =  $\{-6, -10, 9, 5\}$ ; range =  $\{-6, 7, -7, 8, 3\}$
- 14) not a function
- 15)  $-\frac{10}{3}$
- 16) 27
- 17) 1.5
- 18)  $(-\infty, -3)$  or  $(-3, \infty)$
- 19) -13
- 20) -35
- 21)  $63x^2 + 15x$
- 22)  $6x + 9$
- 23)  $f^{-1}(x) = \frac{x+7}{8}$
- 24) -3
- 25) domain of f:  $[2, \infty)$



- 26) -2
- 27) 16
- 28) 4
- 29)  $\frac{1}{1000}$
- 30)  $10\sqrt{6x}$
- 31)  $-3a^3b^3\sqrt[3]{a^2b}$
- 32)  $4xy\sqrt{6y}$

## Answer Key

Testname: MATH 91 SAMPLE TEST NONMULTIPLE

33)  $6\sqrt[3]{a}$

34)  $-49\sqrt{2}$

35)  $30 - 11\sqrt{x} + x$

36)  $571 - 36\sqrt{7}$

37)  $5\sqrt[3]{4x}$

38)  $\frac{9 + 2\sqrt{14}}{5}$

39) {2}

40) {3, -1}

41)  $18 + 12i$

42)  $\frac{36}{73} + \frac{50}{73}i$

43)  $83 - 17i$

44)  $\left\{ \pm \frac{\sqrt{35}}{7} \right\}$

45)  $\{5 \pm 9i\}$

46)  $\frac{4}{81}; x^2 + \frac{4}{9}x + \frac{4}{81} = \left(x + \frac{2}{9}\right)^2$

47)  $\frac{9}{4}; x^2 + 3x + \frac{9}{4} = \left(x + \frac{3}{2}\right)^2$

48)  $\{-6 \pm \sqrt{19}\}$

49)  $s = \frac{\sqrt{3Vh}}{h}$

50)  $\sqrt{130}$  units

51)  $\left\{ \frac{-7 \pm \sqrt{21}}{2} \right\}$

52)  $\left\{ \frac{-2 \pm \sqrt{3}}{2} \right\}$

53) 5 ft by 15 ft

54) width = 9 ft; length = 22 ft

55) 2.6 sec

56)  $f(x) = (x + 3)^2 + 3$

57)  $f(x) = -x^2 + 1$

Answer Key

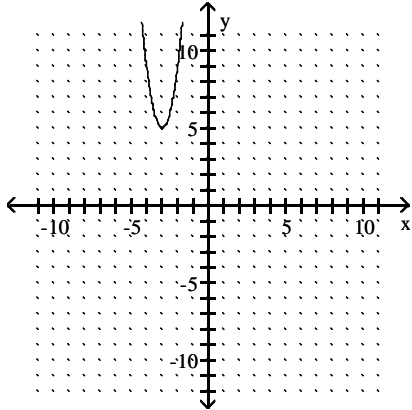
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58) vertex:  $(-3, 5)$

x-intercepts: none

y-intercept:  $(0, 41)$

axis of symmetry:  $x = -3$



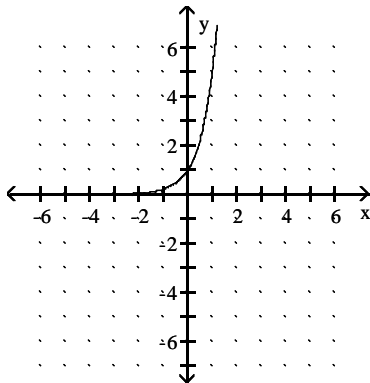
59) Maximum is  $-7$  at  $x = 1$ .

60)  $\{-2, 2, -3, 3\}$

61)  $\{3, 6\}$

62)  $\left\{\frac{1}{3}, 1\right\}$

63)



64)  $2^x = 32$

65)  $\log_{13} y = 2$

66)  $\frac{1}{2}$

67)  $\frac{1}{3}$

68)  $\log_b y + 8 \log_b z$

69)  $\log_b x + 5 \log_b y - 6 \log_b z$

70)  $\ln \left( \frac{x^8}{4\sqrt{y}} \right)$

71)  $\ln \left( \frac{a^2}{b^9} \right)$

72)  $0.6131$

# Answer Key

Testname: MATH 91 SAMPLE TEST NONMULTIPLE

73)  $\{-4\}$

74)  $\{-3\}$

75)  $\{1\}$

76)  $\left\{\frac{3}{10}\right\}$

77)  $\left\{\frac{1}{4}\right\}$

78)  $\left\{\frac{6}{5}\right\}$

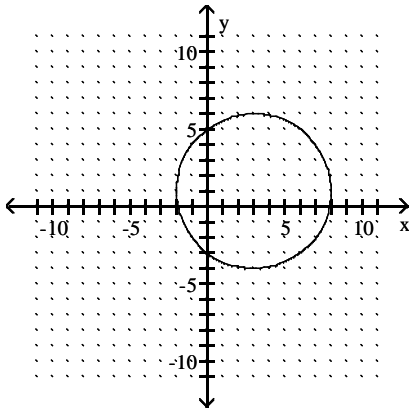
79)  $\{13\}$

80) 2018

81) 9 years after the initial investment

82)  $(x + 6)^2 + (y + 2)^2 = 1$

83) center  $(3, 1)$ ,  $r = 5$



84)  $\frac{x^2}{49} + \frac{y^2}{25} = 1$

85)  $(-1, 0), (1, 0)$

86) nonlinear system

87)  $\{(2, 4)\}$

88)  $\{(\sqrt{3}, 0), (-\sqrt{3}, 0)\}$

89) 3, 7, 11, 15

90) -4, 16, -64, 256

91) 1, 16,  $\frac{81}{2}$ ,  $\frac{128}{3}$

92) 40

93) 30

94) 3

95) 4, 8, 12, 16, 20

96) -3

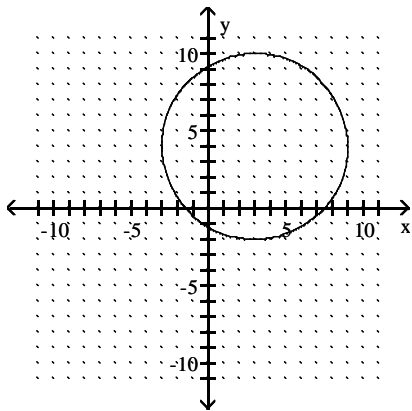
97) 5, 10, 20, 40, ...

Answer Key

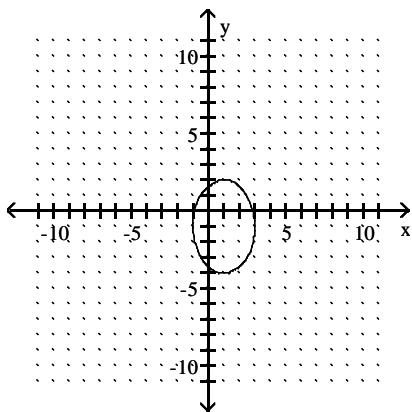
Testname: MATH 91 SAMPLE TEST NONMULTIPLE

98)  $(x - 3)^2 + (y - 4)^2 = 36$

center  $(3, 4)$ ,  $r = 6$



99)



100)

