# MATH 1301 (College Algebra) - Final Exam Review

(Revised: Fall 2009)

This Review is comprehensive but should not be the only material used to study for the Final Exam. It should not be considered a preview of the Final Exam. Studying your previous tests, quizzes, homework, class notes, text discussions, etc. will prepare you to do well on the Final Exam. There may be questions on the Final Exam that are unlike questions on this Review, and vice versa. No question on this Review will be duplicated exactly on the Final Exam. This Review is much longer than the Final Exam.

You may obtain help working on this Review in the Math Lab located in 925-N.

1. Classify each number. Choose all correct answers.

   a. $\sqrt{9}$ : (i) natural number (ii) integer (iii) rational number (iv) real number

   b. $\sqrt{2}$ : (i) natural number (ii) integer (iii) rational number (iv) real number

   c. $\frac{22}{7}$ : (i) natural number (ii) integer (iii) rational number (iv) real number

   d. $-10$ : (i) natural number (ii) integer (iii) rational number (iv) real number

2. For each measured quantity, choose the set of numbers that is best appropriate to describe it. (There is one correct answer for each part.)

   a. Population of a town: (i) natural number (ii) integer (iii) rational number (iv) real number

   b. Gallons of gasoline purchased at last fill-up:
   (i) natural number (ii) integer (iii) rational number (iv) real number

3. This table shows the total enrollment of students at Texas Southern University (TSU) from 2000 to 2007.

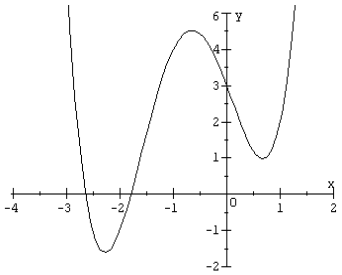
| $x$ (years after 2000) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| $y$ (enrollment in 1000's) | 6.8 | 8.0 | 9.8 | 10.9 | 11.5 | 11.4 | 11.3 | 9.5 |

Find the percent change in the enrollment at TSU from 2003 to 2007. Interpret your answer.

A. From 2003 to 2007, the change in TSU's enrollment was $-1.4$.
B. From 2003 to 2007, the percent change in TSU's enrollment was $-0.128$.
C. From 2003 to 2007, TSU's enrollment decreased by $12.8\%$.
D. From 2003 to 2007, TSU's enrollment decreased by $14.7\%$.
E. none of these

4. Which of the following graphs are functions?

i.



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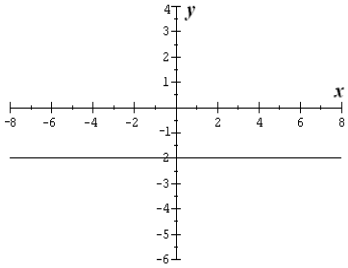

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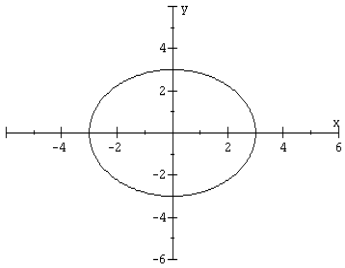
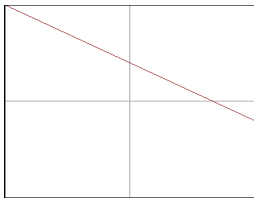
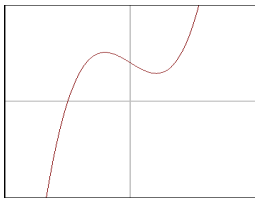
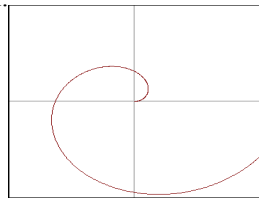


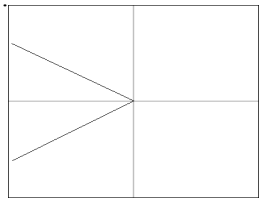
A. i) only
B. iii) only
C. i) and iii)
D. i) and ii)
E. none of these

5. Which of the following graphs are <u>not</u> functions?

i. 

ii. 

iii. 

iv. 

6. Which of the following relations are functions?

i.

| $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $y$ | 0 | $-1$ | $-2$ | $-3$ |

ii.

| $x$ | 0 | 0 | 2 | 3 |
|---|---|---|---|---|
| $y$ | 2 | 5 | 7 | 11 |

iii.

| $x$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $y$ | 2 | 2 | 2 | 2 |

iv.

| $x$ | 0 | 1 | 2 | 2 |
|---|---|---|---|---|
| $y$ | 10 | 8 | 7 | 7 |

7. What is the domain of the function $f(x) = \dfrac{x+1}{2x-1}$?

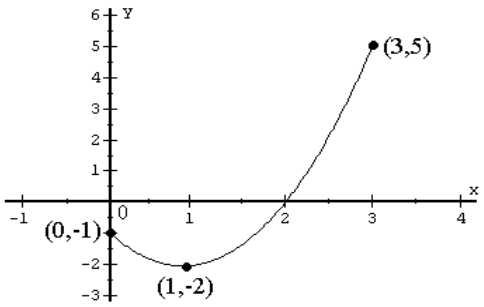
8. What is the domain of the function $y = \sqrt{x-6}$ ?

A. $x \geq 6$ B. $x < 6$ C. $x \leq 0$ D. $x \leq 6$ E. $x > 0$

9. What is the domain of the function $f(x) = \dfrac{1}{(x-6)(x-2)}$ ?

10. What is the domain of the function $f(x) = x^2 - 2x - 3$ ?

11. Find the domain and range of the function $f$ graphed here.

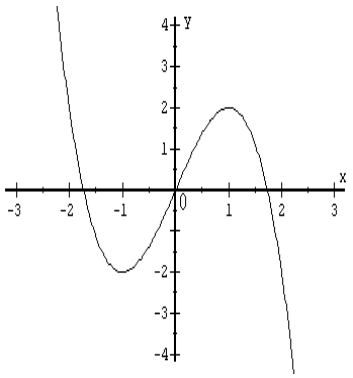



A. domain $= [0, 3]$, range $= [-1, 5]$
B. domain $= [0, 3]$, range $= [-2, 5]$
C. domain $= [-2, 5]$, range $= [0, 3]$
D. domain $= [-1, 4]$, range $= [-3, 6]$
E. domain $= (-\infty, \infty)$, range $= (-\infty, \infty)$

12. For the function $f$ graphed in Question 11, determine: i. $f(0)$ ii. $f(1)$ iii. $f(2)$ iv. $f(3)$

13. For the function $h$ graphed here, determine:

i. $h(-1)$
ii. $h(0)$
iii. $h(1)$




14. Given that $f(x) = 3x + 5$, find $f(a - 1)$.

A. $3a + 4$ B. $3a + 5$ C. $3a + 2$ D. $3a + 8$ E. $3a - 3$

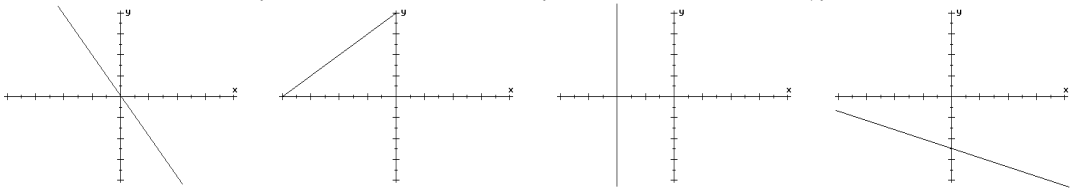
15. Fill in the blanks: If $q(-2.5) = 3.2$, then the point (_____, _____) lies on the graph of $q$.

16. For a person $x$ inches tall with a sprained ankle, the length of crutches, in inches, that he or she may need is approximated by $f(x) = 0.92x + 2$. Evaluate and interpret $f(75)$.

A. A person 75 inches tall needs crutches that are approximately 71 inches long.
B. A person 71 inches tall needs crutches that are approximately 75 inches long.
C. A person 75 inches tall needs crutches that are approximately 146 inches long.
D. A person 75 inches tall needs crutches that are approximately 75 inches long.
E. none of these

17. Which of the following lines have negative slope?

i. ii. iii. iv.



18. Find the slope and the $y$-intercept of the line: $2x - 3y - 3 = 0$

19. Which of the following is <u>not</u> true about the graph of the line $4x - 5y = 20$ ?

A. It rises from left to right.
B. It has $y$-intercept $= -4$.
C. It passes through the point $(10, 4)$.
D. It has slope $\frac{5}{4}$.
E. It has $x$-intercept $= 5$.

20. The slope of the line $3x + 5y + 1 = 0$ is:

A. $-\frac{3}{5}$ B. $-\frac{5}{3}$ C. $-\frac{1}{3}$ D. $-\frac{1}{5}$ E. 3

21. The slope of the line passing through the points $(-3, 1)$ and $(2, 3)$ is:

A. $\frac{5}{2}$ B. $-\frac{1}{4}$ C. $\frac{2}{5}$ D. $-\frac{2}{5}$ E. undefined

22. The slope of a line which is perpendicular to the line $y = -2x + 6$ is:

A. $-\frac{1}{2}$ B. $\frac{1}{2}$ C. $-2$ D. $2$ E. $-\frac{1}{6}$

23. The equation of the line passing through the points $(1, -1)$ and $(-1, 3)$ is:

A. $y = 2x - 3$ B. $y = -\frac{1}{2}x - \frac{1}{2}$ C. $y = -2x - 1$
D. $y = -2x + 1$ E. $y = -x$

24. Find the equation of the line with $x$-intercept $= -2$ and $y$-intercept $= 3$.

25. Which of the following is the equation of the line passing through the point $(-1, 3)$ and perpendicular to the line $3x + 2y = -2$?

A. $2y - 3x = 11$ B. $3x + 2y = 3$ C. $2x - 3y = -11$
D. $2x + 3y = -7$ E. $2x + 3y = 7$

26. Which of the following is true for the lines with equations $x + 2y = 5$ and $y = -\frac{1}{2}x + 1$?

A. The lines are parallel. B. The lines are perpendicular.
C. The lines are neither parallel nor perpendicular. D. The lines are the same.
E. The lines are horizontal.

27. The equation of the line with slope $5$ passing through the point $(-2, -3)$ is:

A. $5x - y = 7$ B. $5x - y = -7$ C. $5x - y = -13$
D. $5x + y = -13$ E. $x + 5y = -17$

28. Determine if the table shown here is linear or nonlinear.

| $x$ | 5 | 6 | 7 | 8 |
|---|---|---|---|---|
| $f(x)$ | 35 | 40 | 45 | 52 |

29. The correct dosage of a particular drug is $50$ mg plus $2$ mg for each pound the patient weighs. Let $y$ be the correct dosage for a patient weighing $x$ pounds. Write a formula for this function.

A. $x = 50y + 2$ B. $50x + 2y = 0$ C. $y = 50x + 2$
D. $y = 2x + 50$ E. $50y = 2x$

30. A particular car that costs $\$22,000$ new is projected to lose $\$300$ in resale value each month. Let $V$ be the resale value after $t$ months. Write a formula for this function.

31. The typical weight $y$, in pounds, for a healthy baby elephant that is $x$ months old is given by

$$y = f(x) = 60x + 250$$

i. Interpret the meaning of the expression $f(2)$. Do not evaluate.
ii. Find the $y$-intercept of this line and interpret its meaning.
iii. Find the slope of this line and interpret its meaning.

32. The amount of oil produced in the U.S. has been decreasing since about 1970. Suppose the following linear function relates the amount of oil, $y$, produced daily in the U.S. (measured in millions of barrels) to the number of years, $x$, since 1970.

$$y = f(x) = 10 - 0.125x$$

i. Interpret the meaning of the expression $f(37)$. Do not evaluate.
ii. Find the $x$-intercept of this line and interpret its meaning.
iii. Find the slope of this line and interpret its meaning.

33. The cost of coffee is directly proportional to the amount purchased. Two and a half pounds of coffee cost \$15. How many pounds of coffee can be bought with \$12?

34. Suppose $y = 16$ when $x = 3$, and the value of $y$ is inversely proportional to the value of $x$. What is the value of $y$ when $x = 6$?

A. $y = 32$ B. $y = 8$ C. $y = 19$ D. $y = 13$ E. none of these

35. Which of the following intervals is the solution set of $-5x > -3x + 4$?
A. $(-\infty, 8)$ B. $(-8, \infty)$ C. $(-2, \infty)$ D. $(-\infty, 2)$ E. $(-\infty, -2)$

36. Solve each inequality, graph the solution set, and write the answer in interval notation.
i. $3x + 5 > x - 7$ ii. $\dfrac{x+1}{5} \leq x - 3$

37. Solve the compound inequality, graph the solution set, and write the answer in interval notation.
$-1 \leq \dfrac{3 - x}{5} \leq 3$

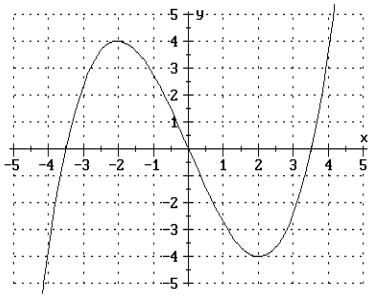
38. Evaluate $f(1)$ given that

$$f(x) = \begin{cases} \sqrt{x+3} & \text{, if } x \geq 0 \\ x^2 - 1 & \text{, if } x < 0 \end{cases}$$

A. 0 B. $\sqrt{3}$ C. 1 D. 2 E. none of these

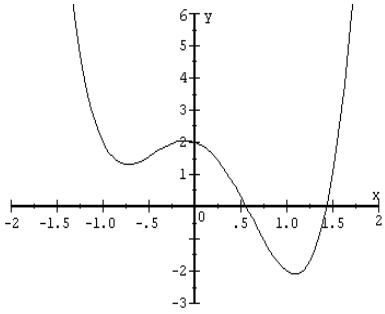
39. Using the piecewise function defined in Question 38, evaluate the following:
i. $f(-3)$ ii. $f(0)$ iii. $f(6)$

40. The graph of a function $f$ is shown here.
i. Where is $f(x) > 0$? ii. Where is $f(x) \leq 0$?




41. For the function $f$ graphed in Question 40, find all values for $x$ such that $f(x) = 0$.

42. The graph of the function $f(x) = 3x^4 - x^3 - 5x^2 - x + 2$ is shown here.




Use this graph to approximate a solution to the equation $3x^4 - x^3 - 5x^2 - x + 2 = 0$.

A. $-0.75$ B. $0$ C. $1.4$ D. $-2$ E. $2$

43. Solve: $|5x - 7| = 2$ and find the sum of the two solutions.

44. Solve the inequality and write the solution in interval notation: $|5x - 7| < 2$

45. The vertex of the parabola with equation $y = 4x^2 + 8x + 7$ is:

A. $(1, 7)$ B. $(1, 3)$ C. $(-1, 3)$ D. $(-1, 7)$ E. $(4, 7)$

46. The $x$-intercepts of the parabola with equation $y = x^2 + 8x + 7$ are:

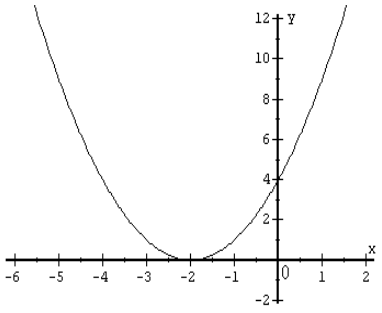
A. $-8, 7$ B. $-1, 8$ C. $-7, -1$ D. $1, 7$ E. it has none

47. Which of the following is **true** for the graph of the function $f(x) = -2x^2 + 4x + 1$?

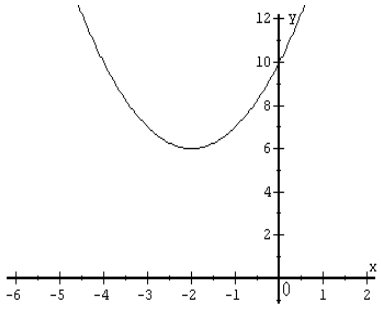
A. It has vertex at $(-1, -5)$ and opens downward.
B. It has vertex at $(1, 3)$ and opens downward.
C. It has vertex at $(-1, 3)$ and opens upward.
D. It has vertex at $(1, 3)$ and opens upward.
E. It has vertex at $(2, 5)$.

48. Which of the following graphs represents the function $y = -x^2 + 4x + 2$?

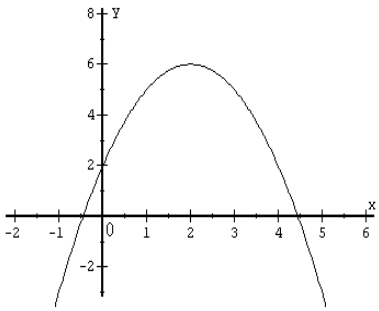
A.



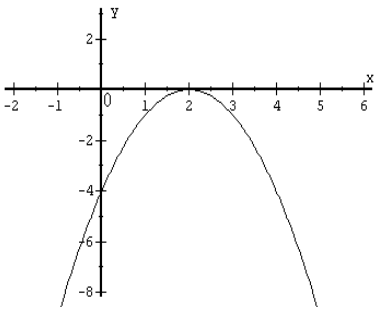

B.




C.




D.




E. none of these

49. Solve the equation: $x^2 + 4x + 1 = 0$

50. Solve the equation: $2x^2 + 5x = 7$

51. Solve the equation: $y(y - 3) = 10$

52. Solve the equation: $w^2 + 6w + 13 = 0$

53. Solve the equation: $2x^2 = -4x - 5$

A. $\dfrac{-4 \pm \sqrt{24i}}{4}$ B. $\dfrac{4 \pm i\sqrt{24}}{4}$ C. $\dfrac{-4 \pm i\sqrt{24}}{4}$

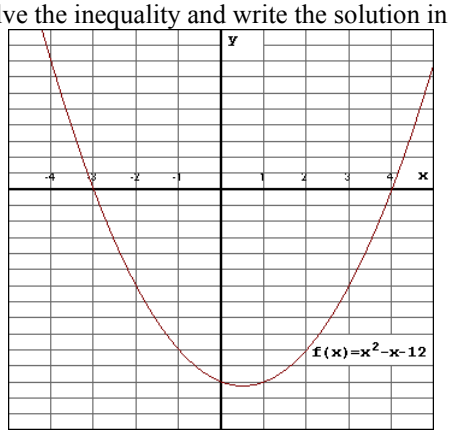
D. $\dfrac{4 \pm \sqrt{56}}{4}$ E. $\dfrac{-4 \pm i\sqrt{56}}{4}$

54. In an experiment, a ball is thrown upward with an initial velocity of 120 feet per second. Let $h$ be the height (in feet) of the ball above the ground $t$ seconds after it was thrown. Then $h = -16t^2 + 120t$.
Find the time required for the ball to return to its point of departure.

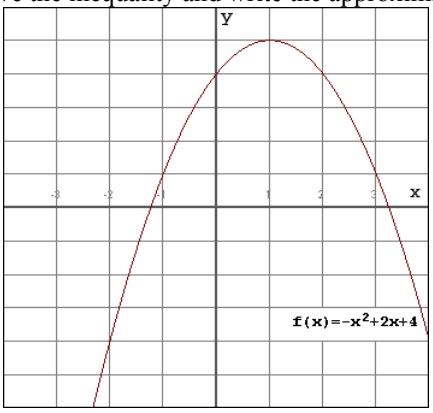
55. In another experiment, a ball is thrown upward with an initial velocity of 160 feet per second. Let $h$ be the height (in feet) of the ball above the ground $t$ seconds after it was thrown. Then $h = -16t^2 + 160t$.
Find the maximum height of the ball.

A. 400 B. 80 C. 160 D. 144 E. none of these

56. Solve the inequality and write the solution in interval notation: $x^2 - x - 12 \geq 0$




57. Solve the inequality and write the approximate solution in interval notation: $-x^2 + 2x + 4 > 0$




A. $(-\infty, 5]$ B. $(-\infty, -1.2) \cup (3.2, \infty)$ C. $[4, \infty)$ D. $(-1.2, 3.2)$ E. none of these

58. Which <u>one</u> of the following functions is a polynomial? What is its $y$-intercept? What is its domain?

A. $f(x) = x^3 + 4x^2 + 3$ B. $f(x) = \sqrt[3]{x^2} + 5$ C. $f(x) = \dfrac{2}{x^3 + 2}$

D. $f(x) = x^{-2} + 3x^{-1} - 4$ E. $f(x) = 2^x$

59. What is the degree of the polynomial function $f(x) = 4x^3 - 0.2x^5 + 1$?
What is the leading coefficient?

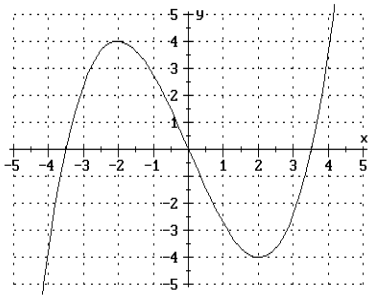
60. At most how many $x$-intercepts can a 3rd degree polynomial function have?

A. 4 B. 3 C. 2 D. infinitely many E. none of these

61. At most how many turning points can a 3rd degree polynomial function have?

A. 4 B. 3 C. 2 D. infinitely many E. none of these

62. The graph of a polynomial function is shown here. What is the minimum degree this polynomial could have?




A. 0 B. 1 C. 2 D. 3 E. none of these

63. Which of the following points is a turning point of the function graphed in Question 62?

A. $(-4, -5)$ B. $(3.5, 0)$ C. $(-2, 4)$ D. $(0, 0)$ E. $(-3.5, 0)$

64. Which of the following values is a local minimum of the function graphed in Question 62?

A. $-2$ B. $-4$ C. 2 D. 4 E. none of these

65. Use the graph in Question 62 to determine the set where the function is decreasing. Use interval notation.

A. $[-3.5, 0]$ B. $(-\infty, -2] \cup [2, \infty)$ C. $[4, -4]$ D. $[-2, 2]$ E. none of these

66. Where is the function $g(x) = -x^2 - 4x + 4$ increasing?

67. Determine the end behavior of the graph of $f(x) = x^4 - 5x^2 + 2x$.

A. It rises on the left and rises on the right.

B. It falls on the left and falls on the right.

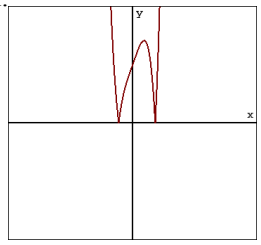
C. It falls on the left and rises on the right.

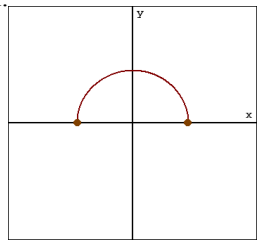
D. It rises on the left and falls on the right.

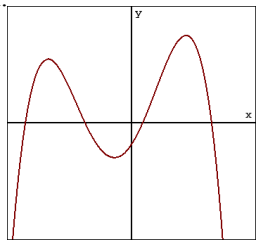
E. none of these

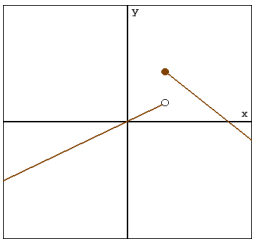
68. Determine the end behavior of the graph of $f(x) = -0.2x^5 + 4x^3 + 1$.

69. Which <u>one</u> of the following graphs could be a **polynomial** function?

i. 


ii. 


iii. 


iv. 


70. Write each expression in $a + bi$ form.

i. $(3 - \sqrt{-36}\,) + (2 + \sqrt{-16}\,)$ ii. $(3 + 4i)(1 - 2i)$

71. Simplify: $(1 + i\,)^2$

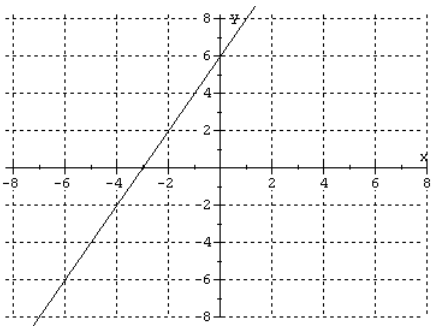
72. Let $f(x) = x^2 - 1$ and $g(x) = x + 2$. Find $(f \circ g)(x)$.

A. $x^2 + 4x + 3$ B. $x^2 + 1$ C. $x^2 + 2$
D. $(x + 1)^2$ E. $(x^2 - 1)(x + 2)$

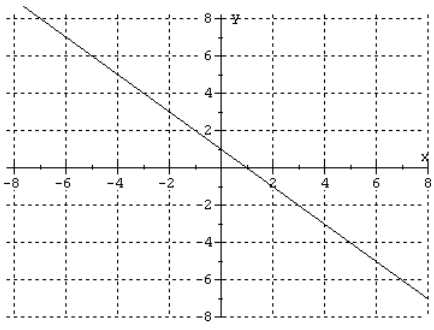
73. Let $f(x) = \sqrt{x}$ and $g(x) = 3x + 1$. Find $f(g(1))$.

A. 4 B. 1 C. 2 D. $\sqrt{3} + 1$ E. $\sqrt{3}$

74. For the functions $f$ and $g$ graphed here, evaluate $(f \circ g)(4)$.




$f$




$g$

75. Which <u>one</u> of the following statements is **false**?

A. Every one-to-one function has an inverse function.
B. The graph of a function and its inverse are reflections of each other about the line $y = x$.
C. The graph of a one-to-one function passes the horizontal line test.
D. If $f$ is a function, its inverse function is $1/f$.
E. The composition of a function and its inverse is the identity function.

76. Let $f(x) = 3x + 6$. Then $f^{-1}(x) =$

A. $\dfrac{1}{3x + 6}$ B. $-3x - 6$ C. $\dfrac{x - 6}{3}$ D. $\dfrac{x}{3} + 2$ E. $6x + 3$

77. Let $f(x) = \sqrt{x + 2}$. Then $f^{-1}(x) =$

A. $-\sqrt{x + 2}$ B. $\dfrac{1}{\sqrt{x} + 2}$ C. $\sqrt{x - 2}$ D. $x^2 - 2$ E. $x^2 + 2$

78. For a person $x$ inches tall with a sprained ankle, the length of crutches, in inches, that he or she may need is approximated by $f(x) = 0.92x + 2$. Interpret the meaning of $f^{-1}(48) = 50$.

A. Crutches that are $50$ inches long are appropriate for a person $48$ inches tall.
B. Crutches that are $50$ inches long are appropriate for a person $98$ inches tall.
C. Crutches that are $48$ inches long are appropriate for a person $48$ inches tall.
D. Crutches that are $48$ inches long are appropriate for a person $50$ inches tall.
E. none of these

79. If $h(x) = (x+3)^5$, find functions $f$ and $g$ such that $h(x) = (f \circ g)(x)$.

80. The intensity $I$ of light (in lumens) $x$ meters below the water surface is given by the formula $I = I_0 k^x$, where $I_0$ is the intensity of light on the water surface and $k$ is the clarity constant of the water. At one location in the Atlantic Ocean, $I_0 = 10$ and $k = 0.6$. Find the intensity of light at a depth of 2 meters.

A. 5 lumens B. 6 lumens C. 3.6 lumens
D. 0.3 lumens E. 1.2 lumens

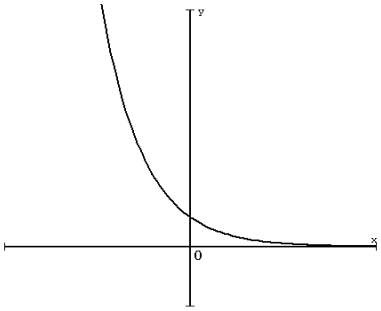
81. For the exponential function $f(x) = 3(1.5^x)$, evaluate $f(-1)$.
A. $-4.5$ B. 0.22 C. 1.5 D. 2 E. none of these

82. For the exponential function $f(x) = 4^x$, evaluate $f\left(\frac{1}{2}\right)$.

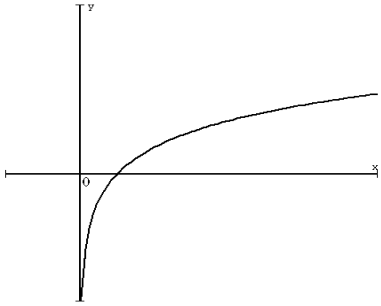
83. Graph the function: $y = 4^x$. Which <u>one</u> of the following statements is **false**?
A. domain $= (-\infty, \infty)$ B. range $= (0, \infty)$ C. The $y$-intercept is $(0, 1)$
D. The graph passes through the point $(2, 6)$ E. There is no $x$-intercept
F. The graph passes through the point $(-1, \frac{1}{4})$

84. Which of the following graphs could represent the function $f(x) = \left(\frac{1}{3}\right)^x$?

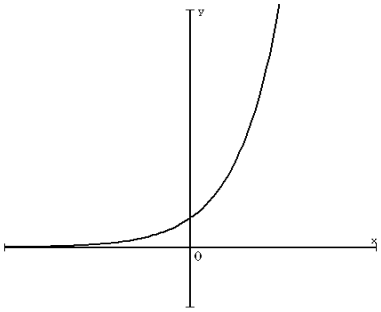
A.



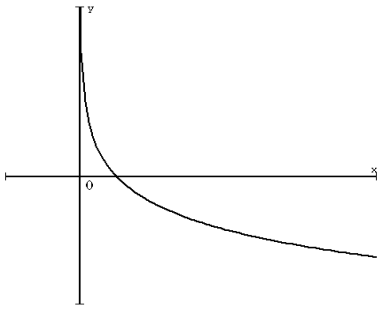

B.




C.




D.

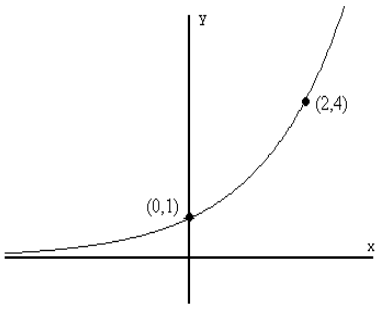



E. none of these

85. Which of the graphs in Question 84 could represent the function $f(x) = \log_2 x$?

86. Which of the following functions is graphed here?

A. $y = 2^x$
B. $y = 4^x$
C. $y = 2x$
D. $y = x + 2$
E. none of these




87. Which equation is equivalent to $3^{-2} = \frac{1}{9}$?

A. $\log_3(-2) = \frac{1}{9}$ B. $\log_{\frac{1}{9}} 3 = -2$ C. $\log_3 \frac{1}{9} = -2$
D. $\log_{(-2)} \frac{1}{9} = 3$ E. none of these

88. Express in logarithmic form: i. $25^{1/2} = 5$ ii. $\left(\frac{1}{2}\right)^{-5} = 32$

89. Write the following equations in exponential form: i. $\log_2 3 = x$ ii. $\log_2 x = 3$

90. Evaluate each of the following:

i. $\log_3 27$ ii. $\log_5 25$ iii. $\log \frac{1}{10}$ iv. $\ln 1$

91. Evaluate: $\log_{\frac{1}{2}} 8$

A. 4 B. 16 C. $-3$ D. 3 E. none of these

92. Find the value of $x$ if $\log_3 x = -2$.

A. $x = \frac{1}{8}$ B. $x = 9$ C. $x = \frac{1}{9}$ D. $x = -6$ E. none of these

93. Find the value of $x$ if $\ln x = -2$.

A. $x = e^2$ B. $x = e^{-2}$ C. $x = 10^{-2}$ D. $x = 10^2$ E. none of these

94. Find the value of $x$ if $\log_x 36 = 2$.

A. $x = 6$ B. $x = 18$ C. $x = \frac{1}{18}$ D. $x = \frac{1}{6}$ E. none of these

95. Expand the following logarithmic expression, writing your answer without exponents: $\ln \frac{x^2}{y^4}$

96. Rewrite the following as a single logarithmic expression: $\frac{1}{2}\log(x+1) + \frac{1}{2}\log(x-1)$

97. Solve: $10^x = 50$

A. $x = 5$ B. $x = \log 50$ C. $x = 50 \cdot \log 10$ D. $x = \log \frac{1}{5}$ E. $x = 500$

98. Solve: $e^{x+2} = 50$

99. Solve the system and find the value of $y$ : $\begin{cases} x + 2y - z = 2 \\ 2x - y \quad\quad = -1 \\ 3x + y + z = 1 \end{cases}$

A. $y = 0$ B. $y = 2$ C. $y = -1$ D. $y = 1$ E. none of these

100. Three hundred people attended a high school play. The admission prices were \$5 for adult, \$3 for high school students and \$2 for children not yet in high school. The ticket sales totaled \$950. If the admission prices were \$6 for adults, \$4 for high school students and \$2 for students not yet in high school, the ticket sales total would have been \$1,100. Let $x$, $y$ and $z$ denote the number of adults, high school students and children, respectively. Find $x$, $y$ and $z$. (*Hint*: Set up and solve a system of equations.)

**ANSWERS**

1a. i,ii,iii,iv 1b. iv 1c. iii,iv 1d. ii,iii,iv

2a. i 2b. iii

3. C 4. D 5. iii,iv 6. i,iii,iv

7. All real numbers except $1/2$ 8. A 9. All real numbers except 2 and 6

10. All real numbers 11. B

12i. $-1$ 12ii. $-2$ 12iii. 0 12iv. 5

13i. $-1.75$ 13ii. 0 13iii. 1.75 14. C

15. $(-2.5, 3.2)$ 16. A 17. i,iv 18. slope $= \frac{2}{3}$, $y$-intercept $= -1$

19. D 20. A 21. C 22. B

23. D 24. $y = \frac{3}{2}x + 3$ 25. C 26. A

27. B 28. nonlinear 29. D 30. $V = 22\,000 - 300t$

31i. $f(2)$ is the typical weight of a healthy baby elephant that is 2 months old.

31ii. $y$-intercept $= 250$; A healthy newborn baby elephant typically weighs 250 lb.

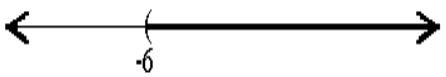
31iii. slope $= 60$; A healthy baby elephant typically gains 60 lb per month.

32i. $f(37)$ is the amount of oil produced daily in the U.S. in 2007.

32ii. $x$-intercept $= 80$; By 2050, no oil will be produced in the U.S.

32iii. slope $= -0.125$; Since 1970, the amount of oil produced daily in the U.S. has decreased by 0.125 million barrels per year.

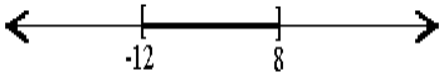
33. 2 lb 34. B 35. E

36i. 

, $(-6, \infty)$

36ii. 

, $[4, \infty)$

37. 

, $[-12, 8]$

38. D

39i. 8

39ii. $\sqrt{3}$

39iii. 3

40i. $(-3.5, 0) \cup (3.5, \infty)$

40ii. $(-\infty, -3.5] \cup [0, 3.5]$

41. $x = -3.5, 0, 3.5$

42. C

43. $\frac{14}{5}$ (1 and $\frac{9}{5}$)

44. $(1, \frac{9}{5})$

45. C

46. C

47. B

48. C

49. $x = -2 \pm \sqrt{3}$

50. $x = -\frac{7}{2}, 1$

51. $y = -2, 5$

52. $w = -3 \pm 2i$

53. C

54. 7.5 sec

55. A

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

57. D

58. A; $y$-intercept $= 3$; domain $=$ all real numbers

59. degree $= 5$; leading coefficient $= -0.2$

60. B

61. C

62. D

63. C

64. B

65. D

66. $(-\infty, -2]$

67. A

68. The graph rises on the left and falls on the right.

69. iii

70i. $5 - 2i$

70ii. $11 - 2i$

71. $2i$

72. A

73. C

74. 0

75. D

76. C

77. D

78. D

79. $f(x) = x^5,\ g(x) = (x + 3)$

80. C

81. D

82. 2

83. D

84. A

85. B

86. A

87. C

88i. $\log_{25} 5 = \frac{1}{2}$

88ii. $\log_{\frac{1}{2}} 32 = -5$

89i. $2^x = 3$

89ii. $2^3 = x$

90i. 3

90ii. 2

90iii. $-1$

90iv. 0

91. C

92. C

93. B

94. A

95. $2 \ln x - 4 \ln y$

96. $\log \sqrt{x^2 - 1}$

97. B

98. $x = \ln 50 - 2$

99. D

100. $x = 100,\ y = 50,\ z = 150$