Exam

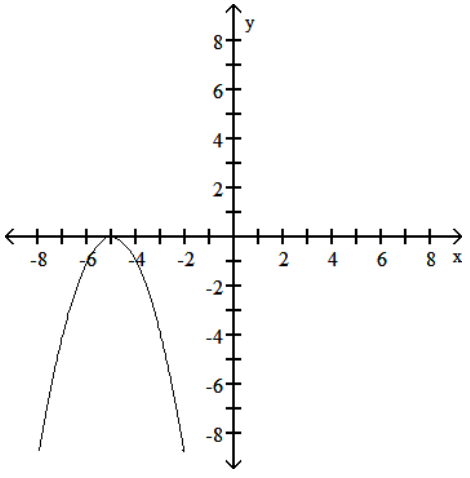
Name_____

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

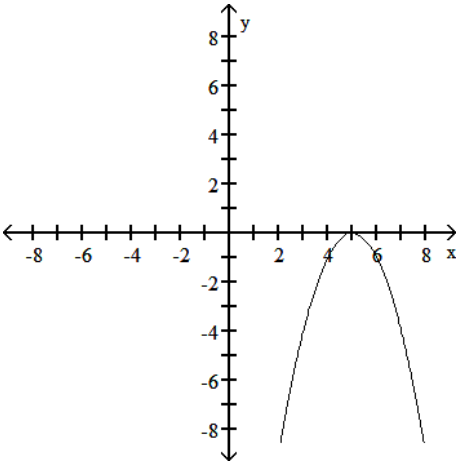
Match the correct graph to the given function.

1) $y = (x + 5)^2$ 1) _____

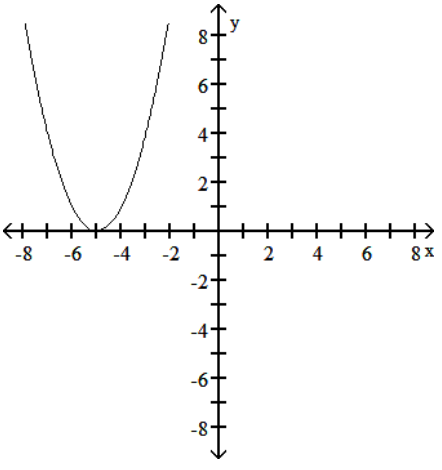
A)



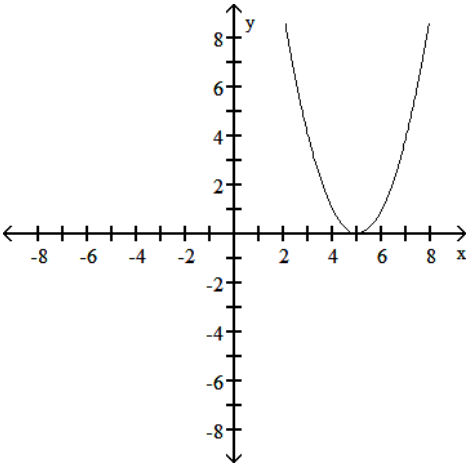
B)



C)



D)



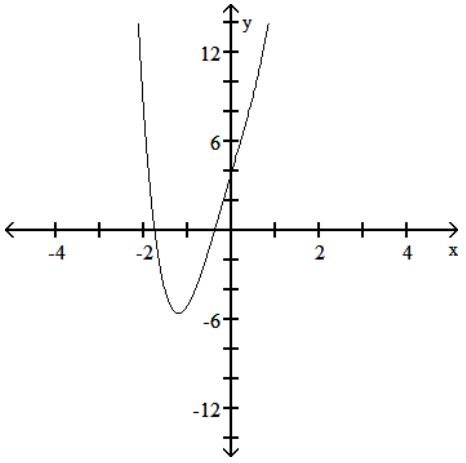
Answer: C

Explanation: A)
B)
C)
D)

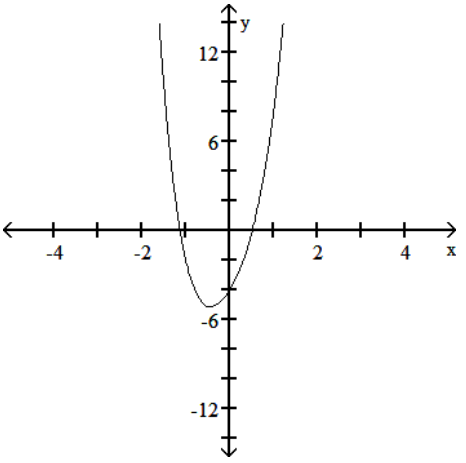
Match the function to the correct graph.

2) $y = 2x^4 - x^3 + 5x^2 + 5x + 4$ 2) _____

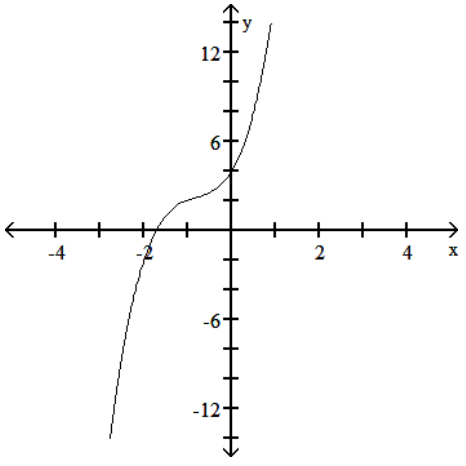
A)



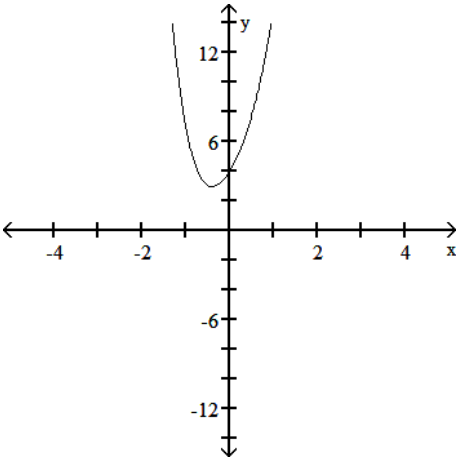
B)



C)



D)



Answer: D

Explanation: A)

B)

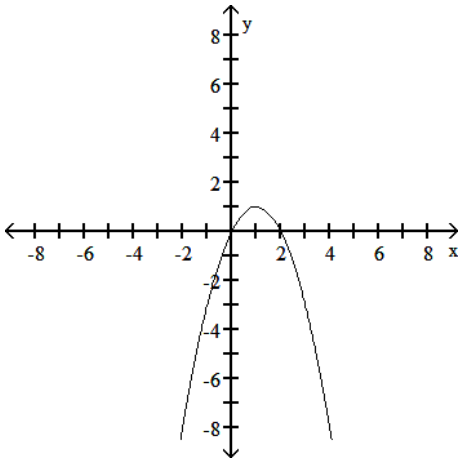
C)

D)

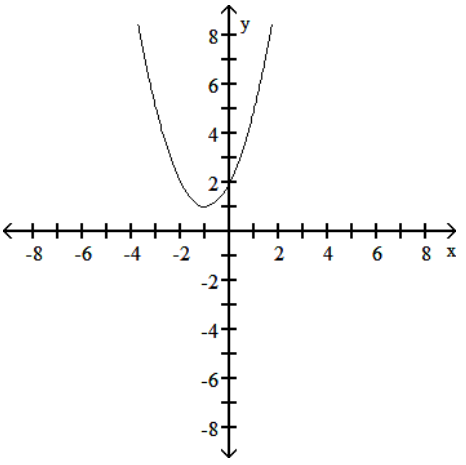
Match the correct graph to the given function.

3) $y = (x + 1)^2 + 1$ 3) _____

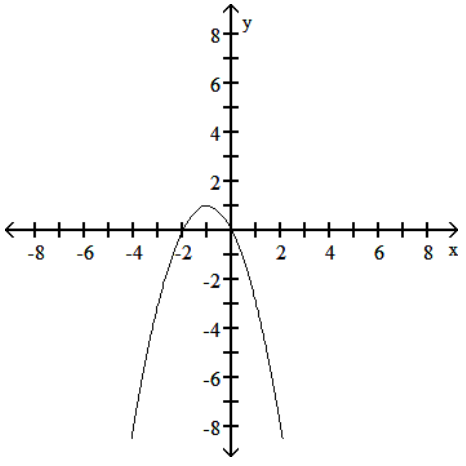
A)



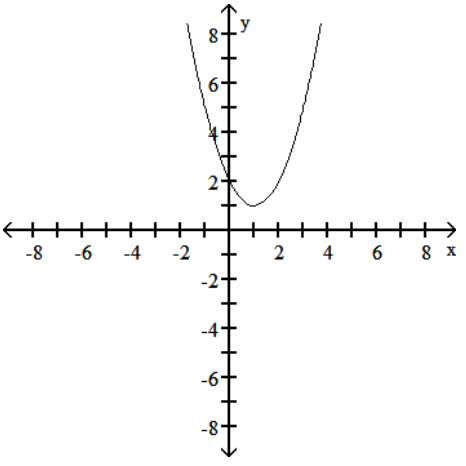
B)



C)



D)



Answer: B

Explanation: A)

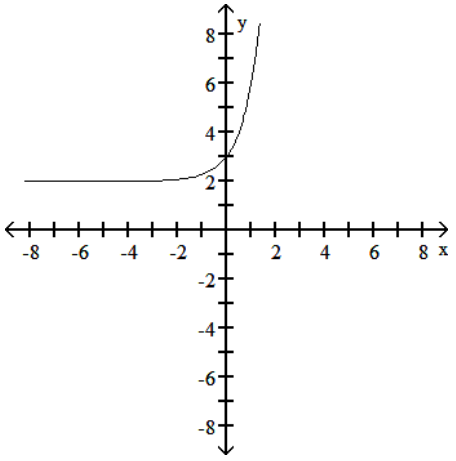
B)

C)

D)

Match the graph to the function.

4) 4) _____



A) $f(x) = 4^x + 2$ B) $f(x) = 4^x$ C) $f(x) = 4^x - 2$ D) $f(x) = 4^x + 2$

Answer: D

Explanation: A)

B)

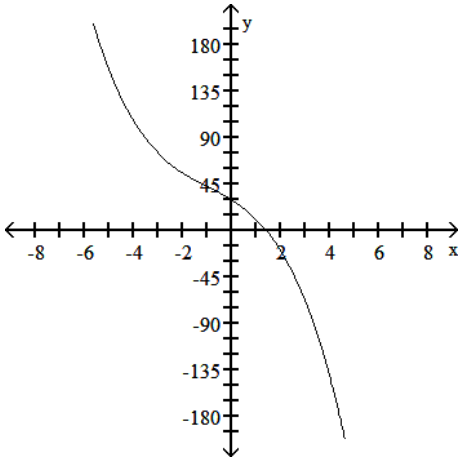
C)

D)

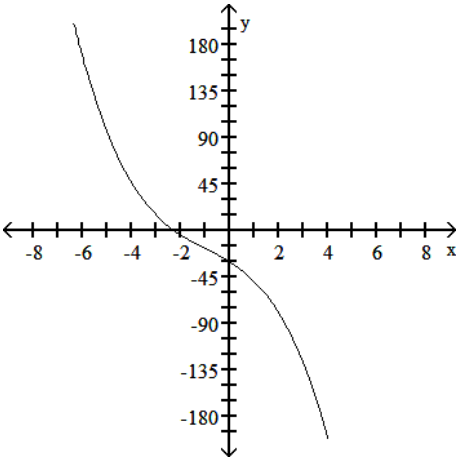
Match the function to the correct graph.

5) $y = -x^3 - 3x^2 - 15x + 30$ 5) _____

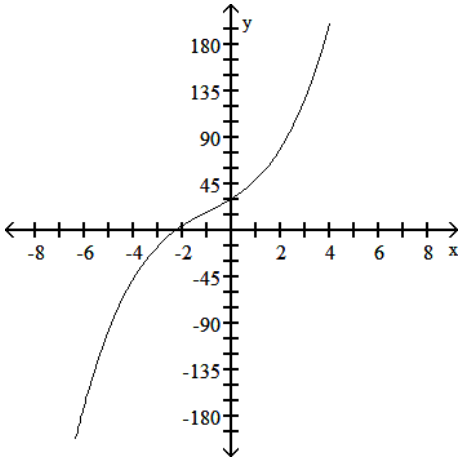
A)



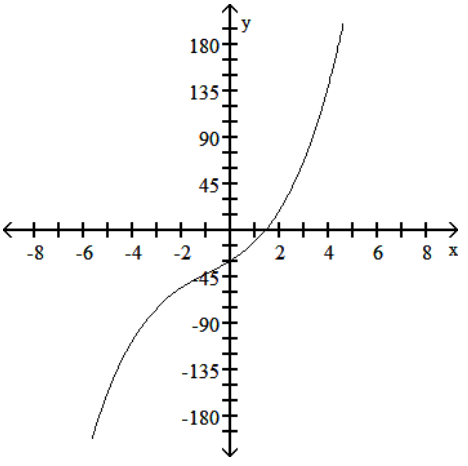
B)



C)



D)



Answer: A

Explanation: A)

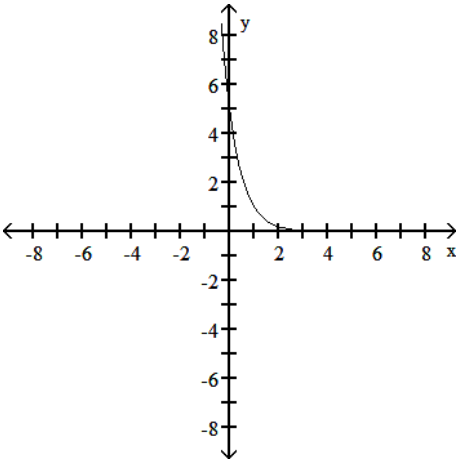
B)

C)

D)

Match the graph to the function.

6) 6) _____



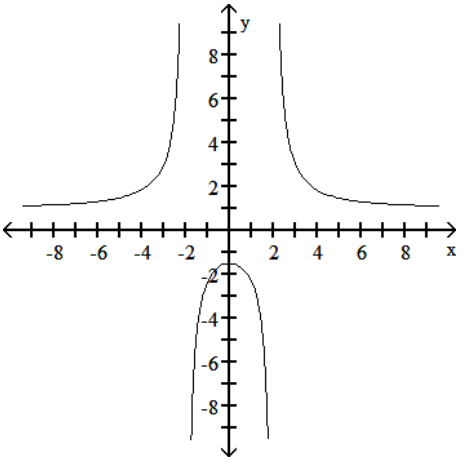
A) $f(x) = 5(5)^x$ B) $f(x) = -5(5)^x$ C) $f(x) = 5\left(\frac{1}{5}\right)^x$ D) $f(x) = -5\left(\frac{1}{5}\right)^x$

Answer: C

Explanation: A)
B)
C)
D)

Match the graph to the correct function.

7) 7) _____

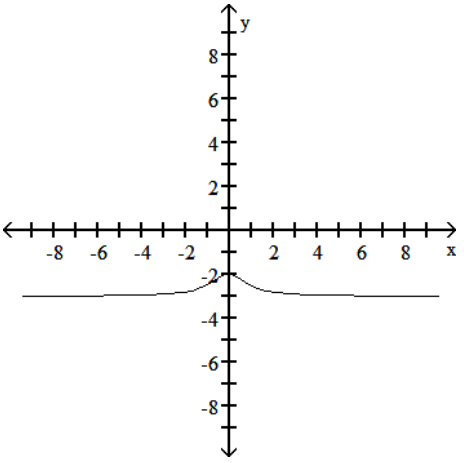


A) $y = \frac{x^2 + 6}{x^3 - 4}$ B) $y = \frac{x^2 + 6}{x^2 - 4}$ C) $y = \frac{x}{x^2 - 4}$ D) $y = \frac{x^2 - 6}{x^2 + 4}$

Answer: B

Explanation: A)
B)
C)
D)

8) 8) _____



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

Answer: B

Explanation: A)

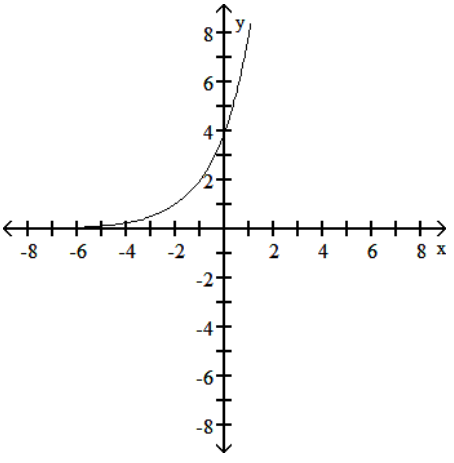
B)

C)

D)

Match the graph to the function.

9) 9) _____



A) $f(x) = 2^x$ B) $f(x) = 2^{x+2}$ C) $f(x) = 2^x + 2$ D) $f(x) = 2^x - 2$

Answer: B

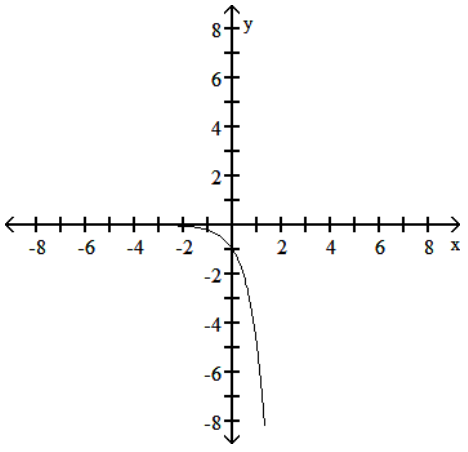
Explanation: A)

B)

C)

D)

10) 10) _____



A) $f(x) = -5^x$ B) $f(x) = 5^{-x}$ C) $f(x) = 5^x$ D) $f(x) = -5^{-x}$

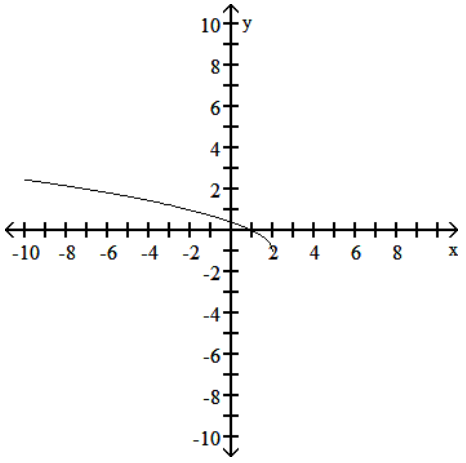
Answer: A

Explanation: A)
B)
C)
D)

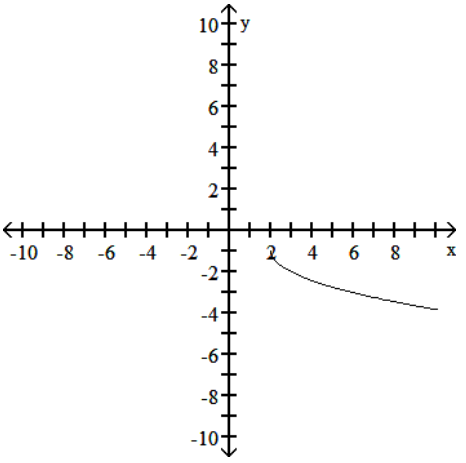
Match the correct graph to the given function.

11) $y = -\sqrt{x + 2} - 1$ 11) _____

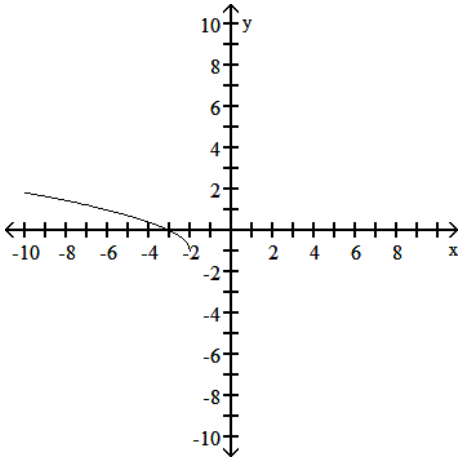
A)



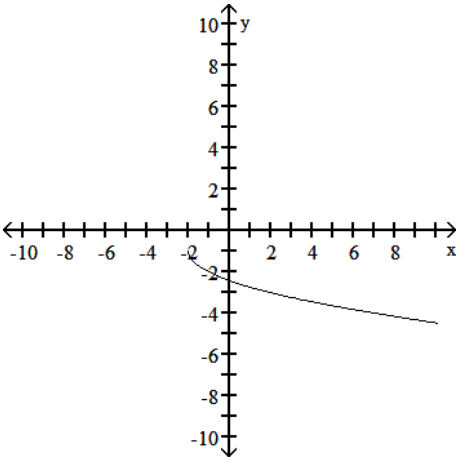
B)



C)



D)



Answer: D

Explanation: A)

B)

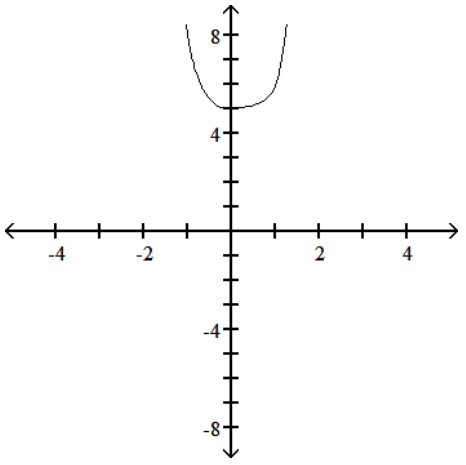
C)

D)

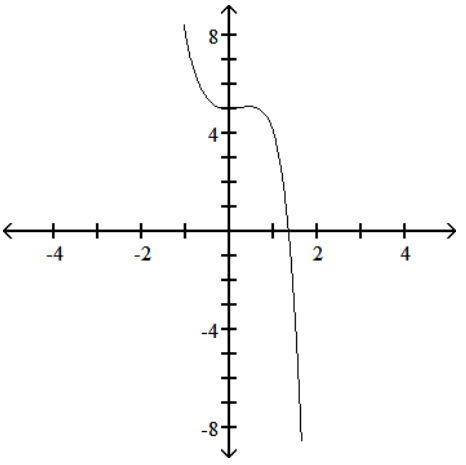
Match the function to the correct graph.

12) $y = x^5 - x^3 + x^2 + 5$ 12) _____

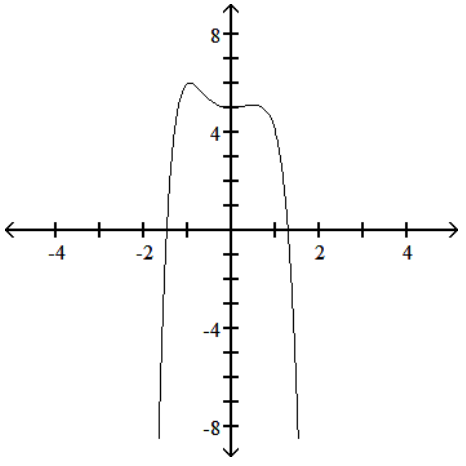
A)



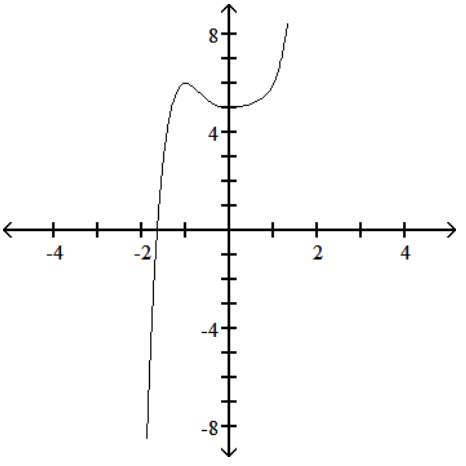
B)



C)



D)



Answer: D

Explanation: A)

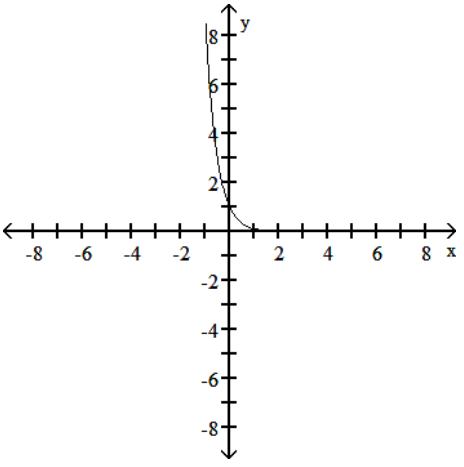
B)

C)

D)

Match the graph to the function.

13) 13) _____

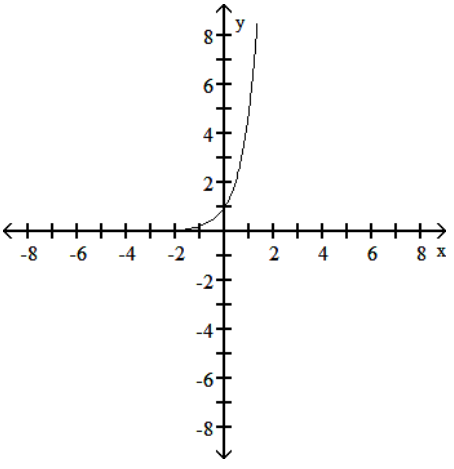


A) $f(x) = -9^x$ B) $f(x) = \left(\frac{1}{9}\right)^x$ C) $f(x) = -\left(\frac{1}{9}\right)^x$ D) $f(x) = 9^x$

Answer: B

Explanation: A)
B)
C)
D)

14) 14) _____



A) $f(x) = 5^x$ B) $f(x) = 5^x + 2$ C) $f(x) = 5^{x-2}$ D) $f(x) = 5^x - 2$

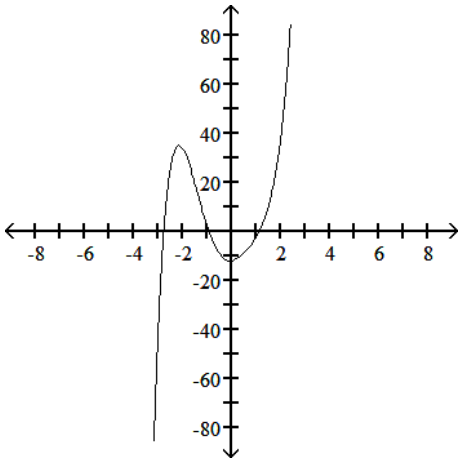
Answer: A

Explanation: A)
B)
C)
D)

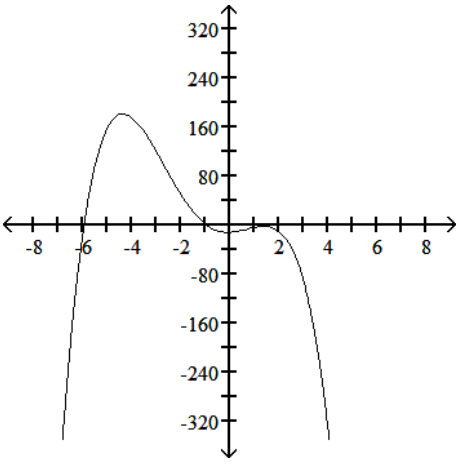
Match the function to the correct graph.

15) $y = x^4 - 4x^3 + 12x^2 + x - 12$ 15) _____

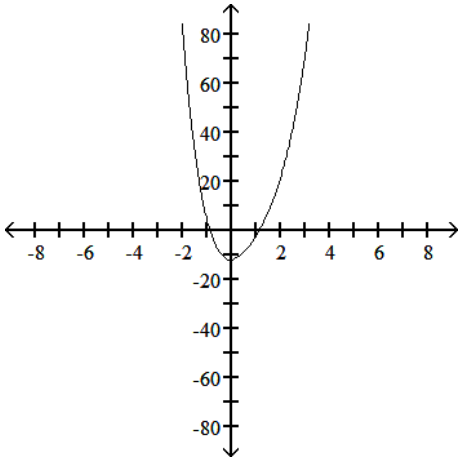
A)



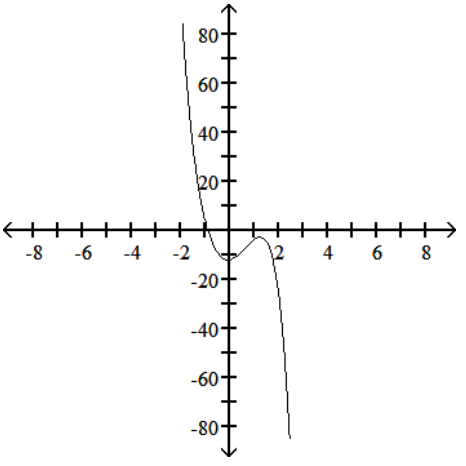
B)



C)



D)



Answer: C

Explanation: A)

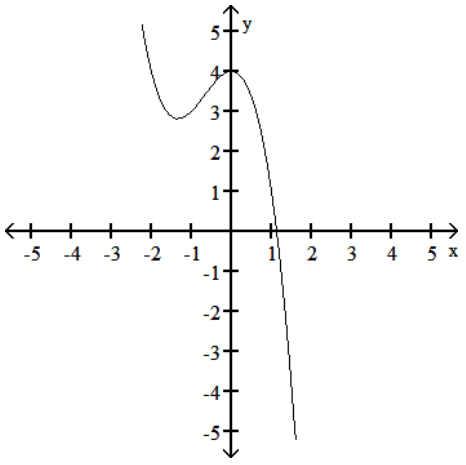
B)

C)

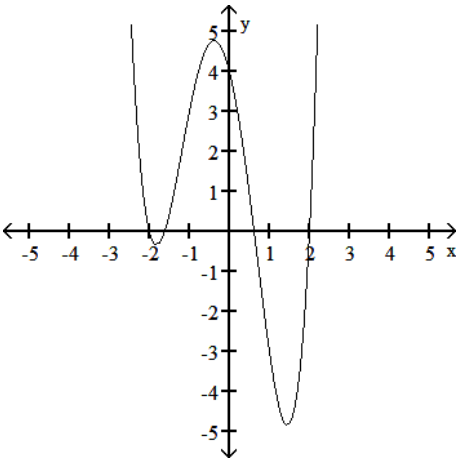
D)

16) $y = x^4 + x^3 - 5x^2 - 4x + 4$ 16) _____

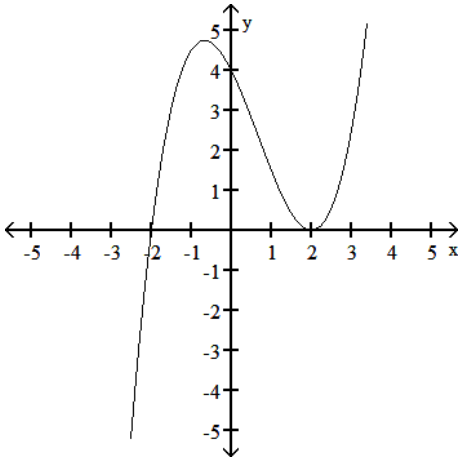
A)



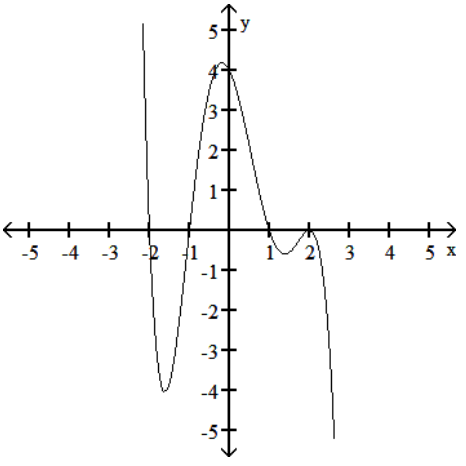
B)



C)



D)



Answer: B

Explanation: A)

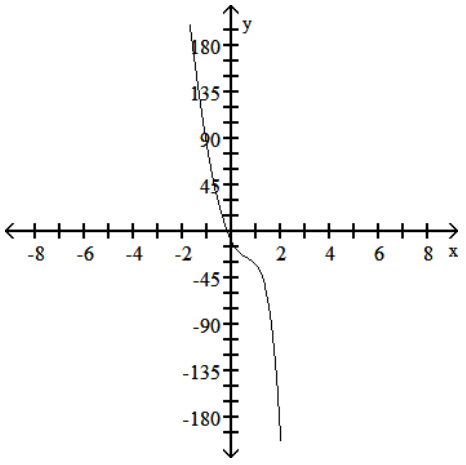
B)

C)

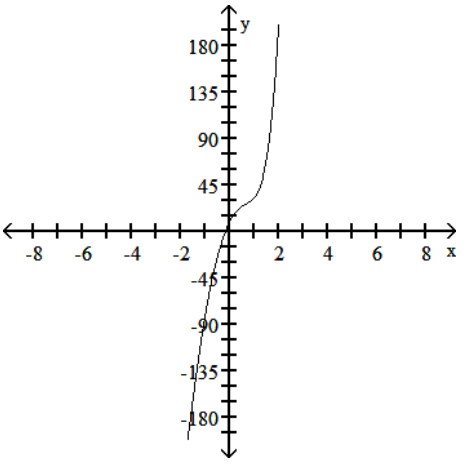
D)

17) $y = 2x^5 + 8x^4 + 10x^3 - 43x^2 - 45x + 10$ 17) _____

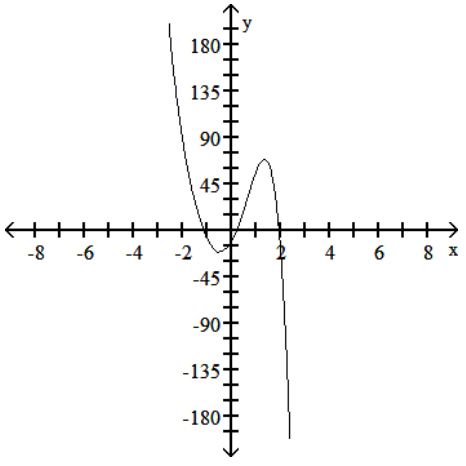
A)



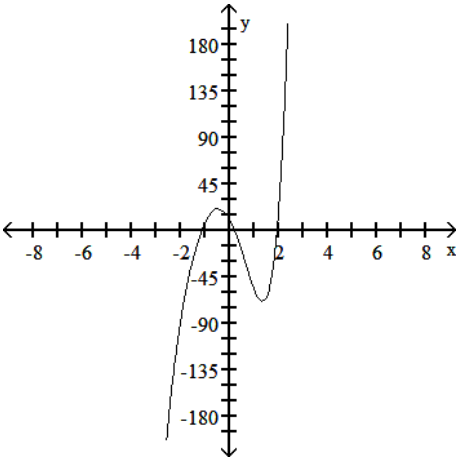
B)



C)



D)



Answer: D

Explanation: A)

B)

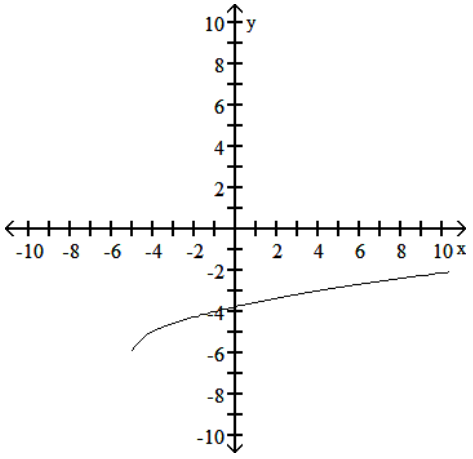
C)

D)

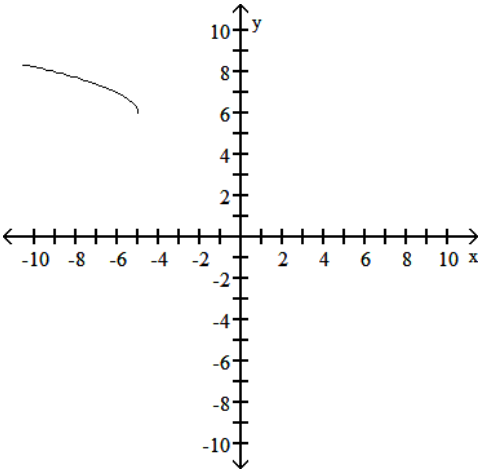
Match the correct graph to the given function.

18) $y = \sqrt{x - 5} + 6$ 18) _____

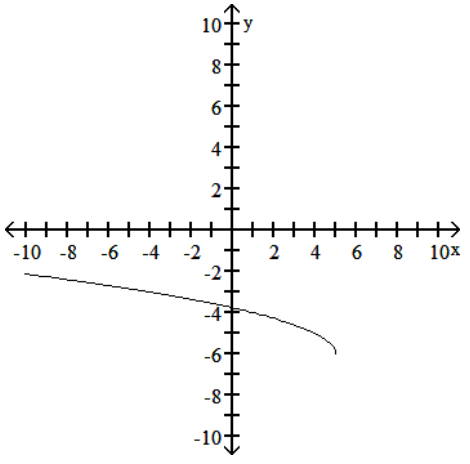
A)



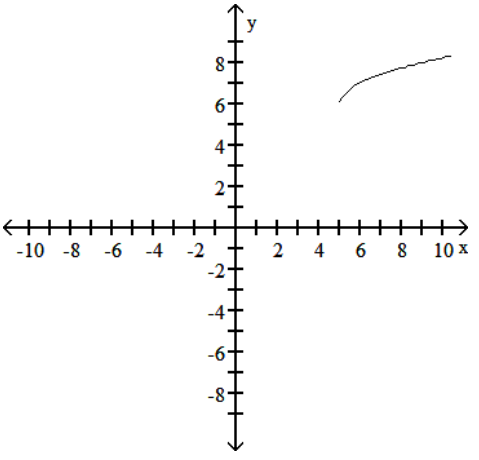
B)



C)



D)



Answer: D

Explanation: A)

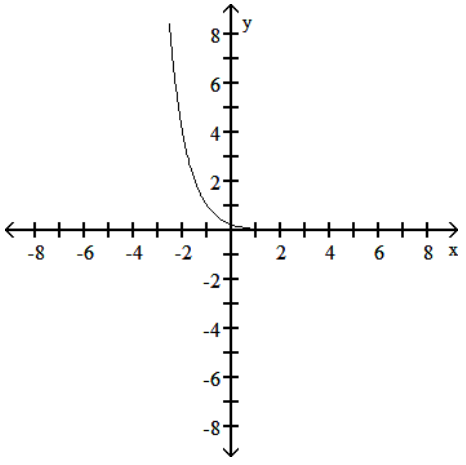
B)

C)

D)

Match the graph to the function.

19) 19) _____



A) $y = \left(\frac{1}{4}\right)^{-1 - x}$ B) $y = \left(\frac{1}{4}\right)^{x + 1}$ C) $y = 4^{-x + 1}$ D) $y = 4^{x - 1}$

Answer: B

Explanation: A)

B)

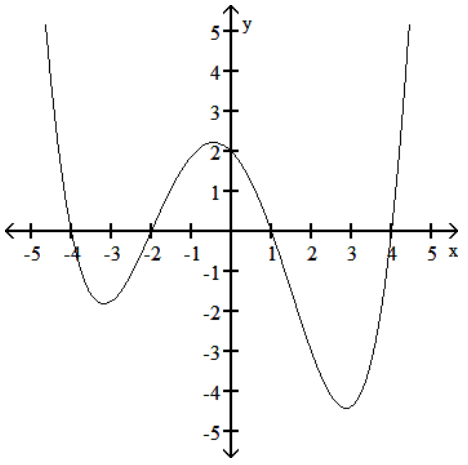
C)

D)

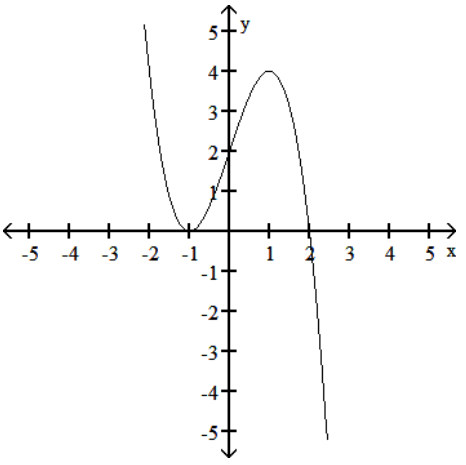
Match the function to the correct graph.

20) $y = x^3 - 3x + 2$ 20) _____

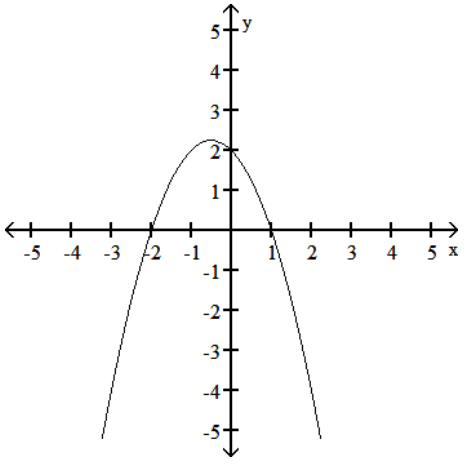
A)



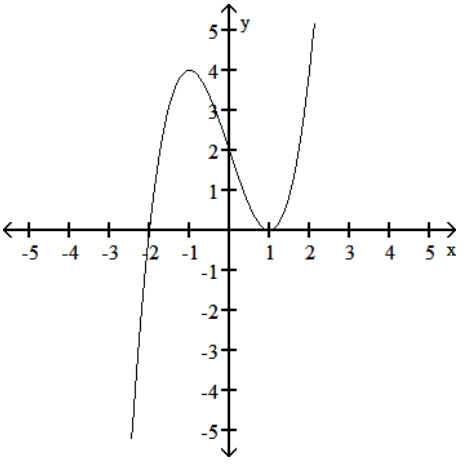
B)



C)



D)



Answer: D

Explanation: A)

B)

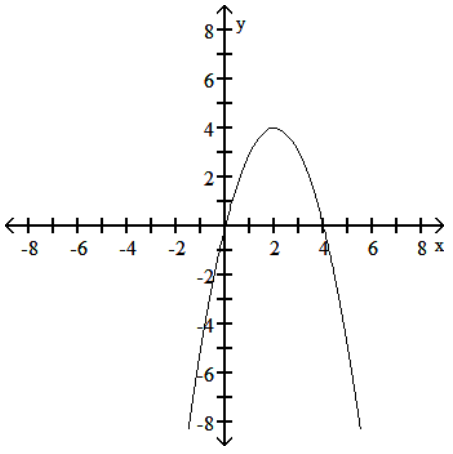
C)

D)

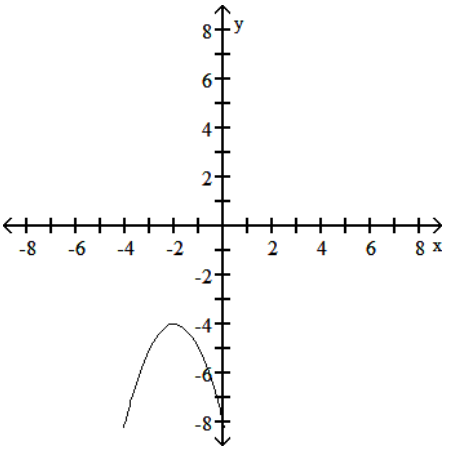
Match the correct graph to the given function.

21) $y = -(2 - x)^2 - 4$ 21) _____

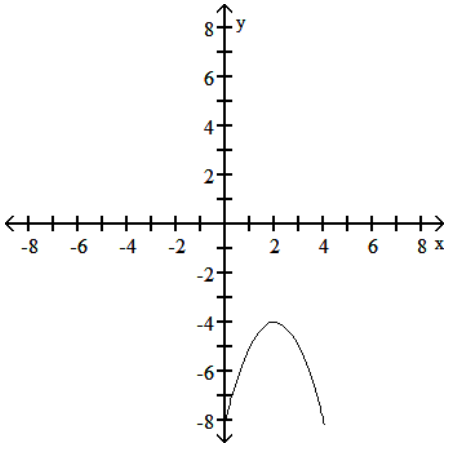
A)



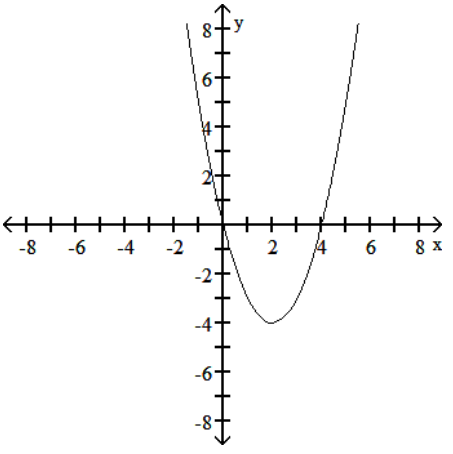
B)



C)



D)



Answer: C

Explanation: A)

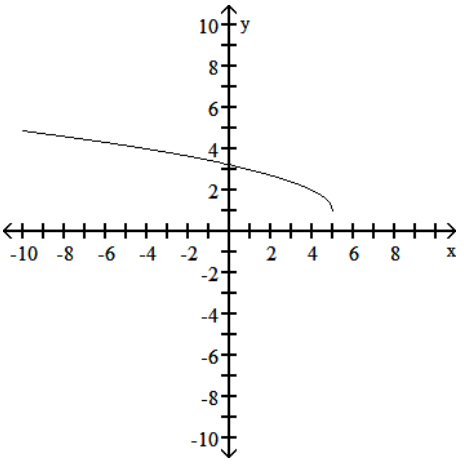
B)

C)

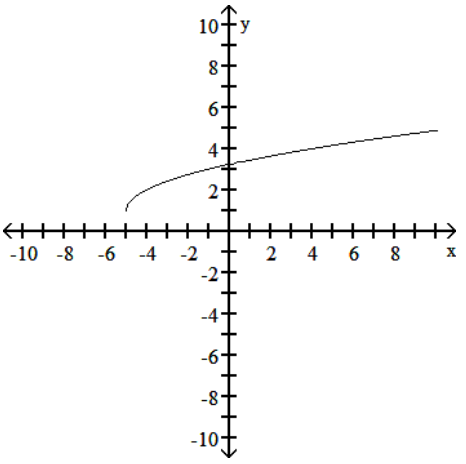
D)

22) $y = \sqrt{-x - 5} + 1$ 22) _____

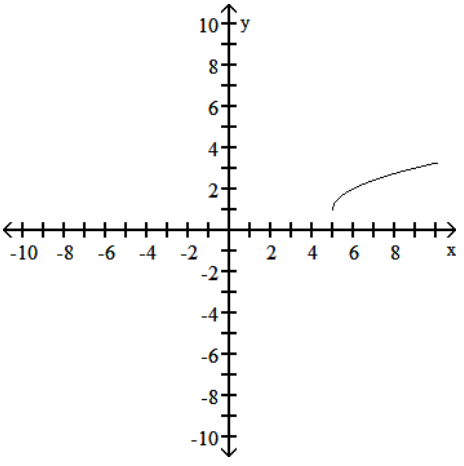
A)



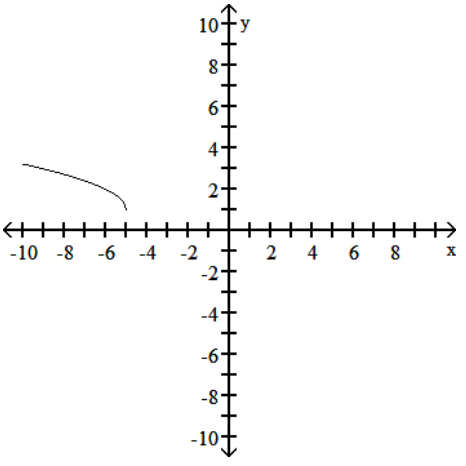
B)



C)



D)



Answer: D

Explanation: A)

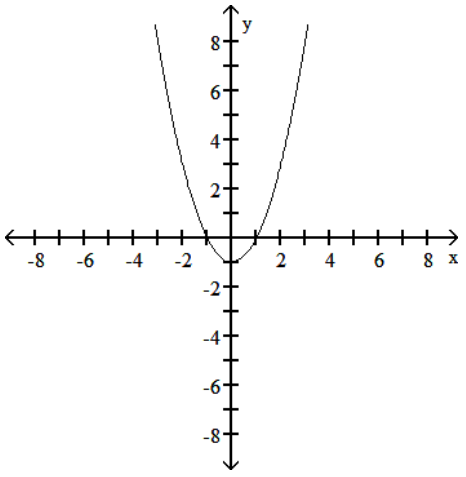
B)

C)

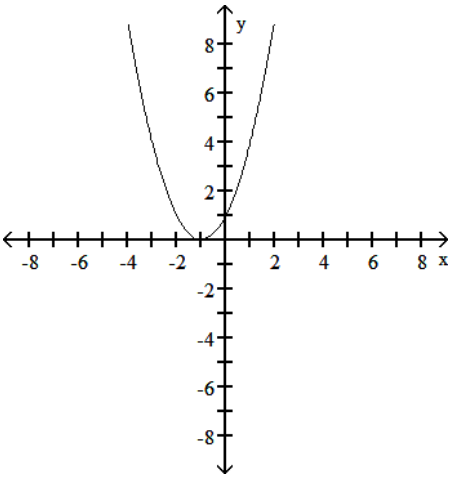
D)

23) $y = x^2 + 1$ 23) _____

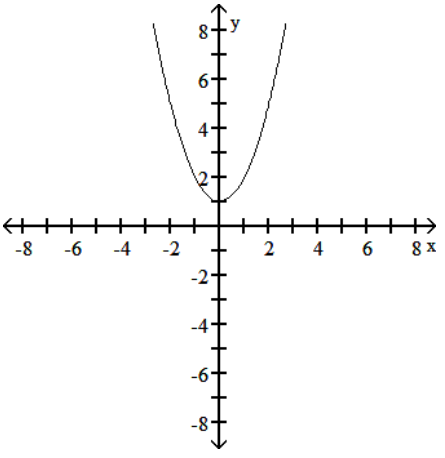
A)



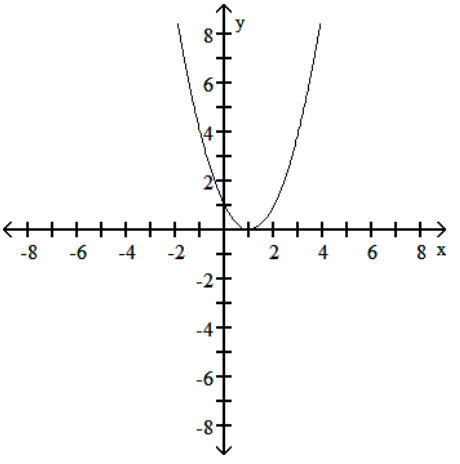
B)



C)



D)



Answer: C

Explanation: A)

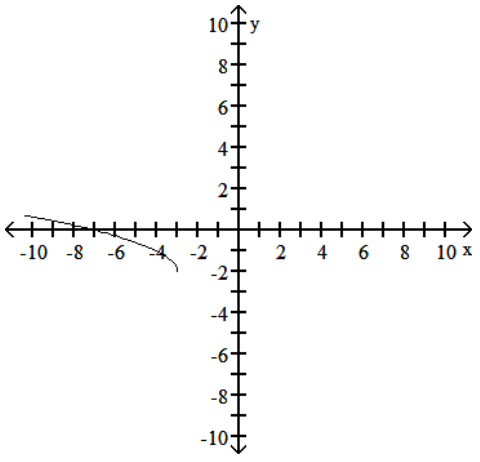
B)

C)

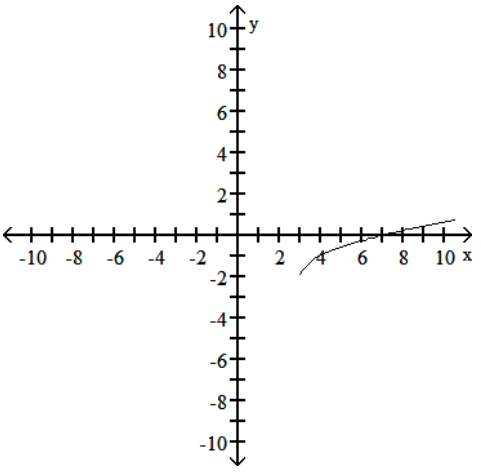
D)

24) $y = \sqrt{x + 3} + 2$ 24) _____

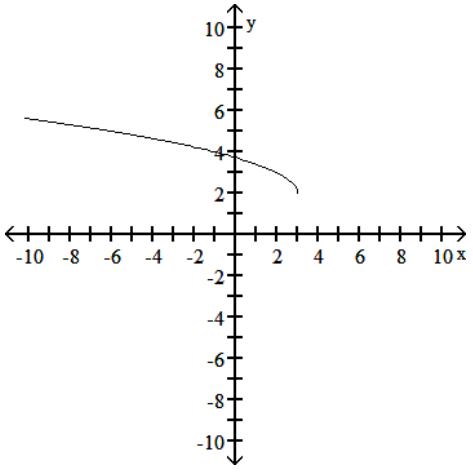
A)



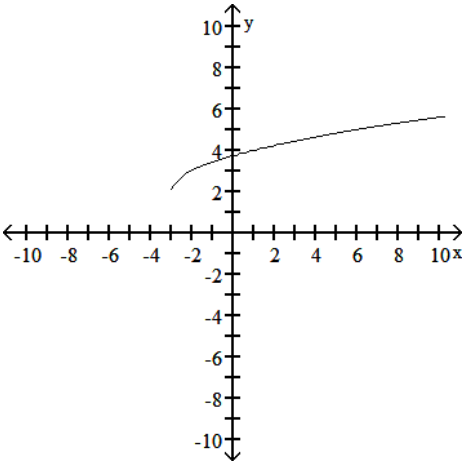
B)



C)



D)



Answer: D

Explanation: A)

B)

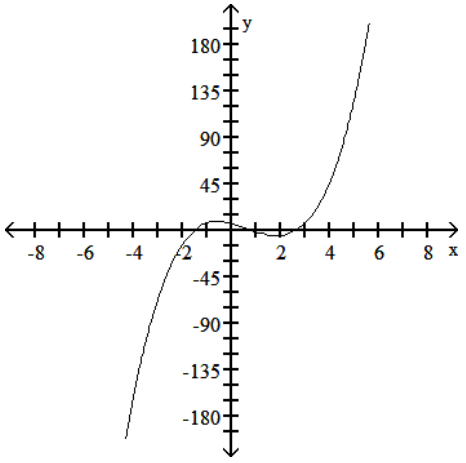
C)

D)

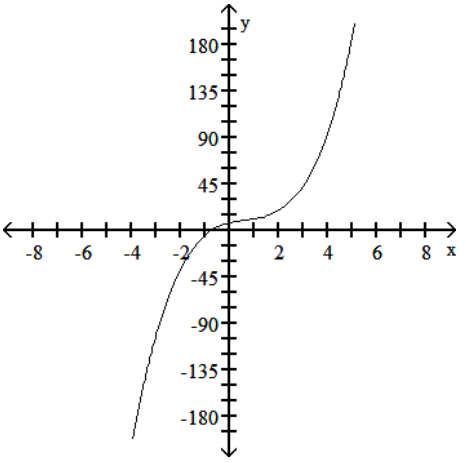
Match the function to the correct graph.

25) $y = 2x^3 - 4x^2 + 6x + 7$ 25) _____

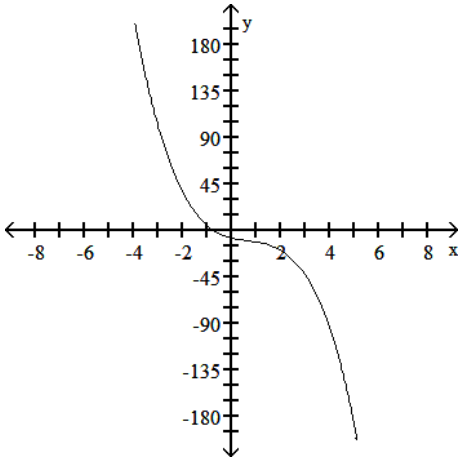
A)



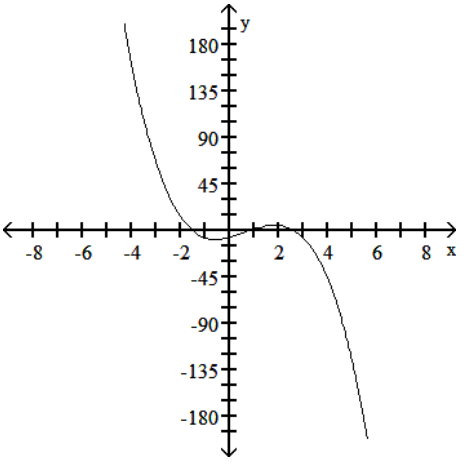
B)



C)



D)



Answer: B

Explanation: A)

B)

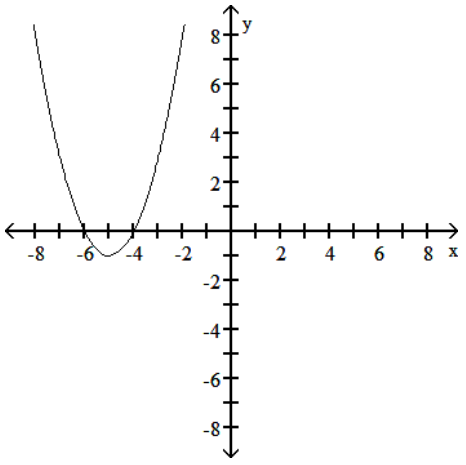
C)

D)

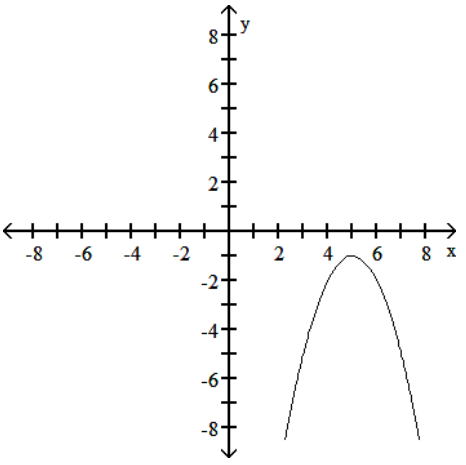
Match the correct graph to the given function.

26) $y = -(x - 5)^2 - 1$ 26) _____

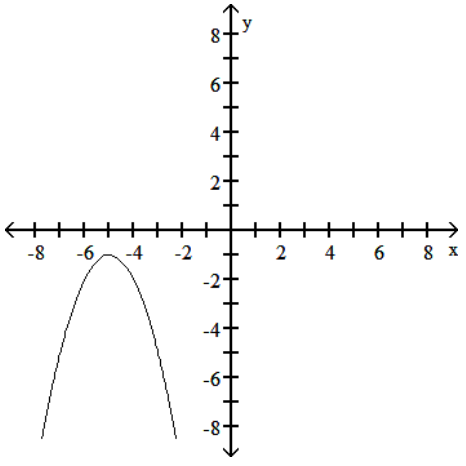
A)



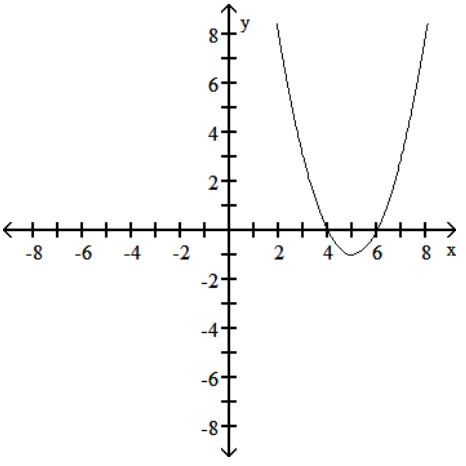
B)



C)



D)



Answer: B

Explanation: A)

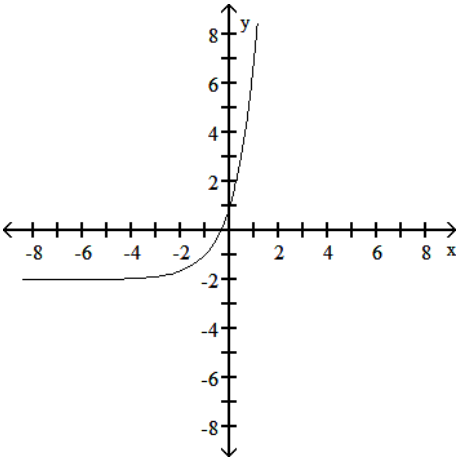
B)

C)

D)

Match the graph to the function.

27) 27) _____

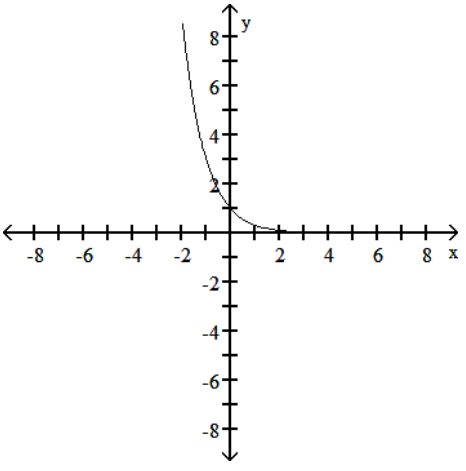


A) $y = \left(\frac{1}{3}\right)^{x - 1} - 2$ B) $y = \left(\frac{1}{3}\right)^{x + 1} - 2$ C) $y = 3^{x + 1} - 2$ D) $y = 3^{x - 1} - 2$

Answer: C

Explanation: A)
B)
C)
D)

28) 28) _____



A) $f(x) = 3^{-x}$ B) $f(x) = -3^{x}$ C) $f(x) = -3^{-x}$ D) $f(x) = 3^{x}$

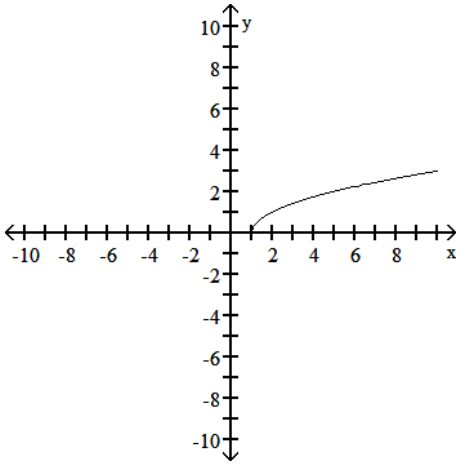
Answer: A

Explanation: A)
B)
C)
D)

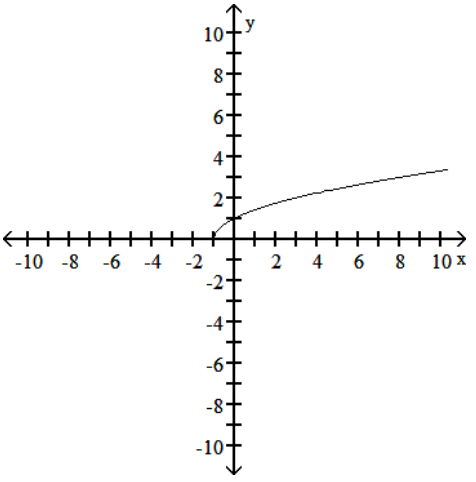
Match the correct graph to the given function.

29) $y = \sqrt{x - 1}$ 29) _____

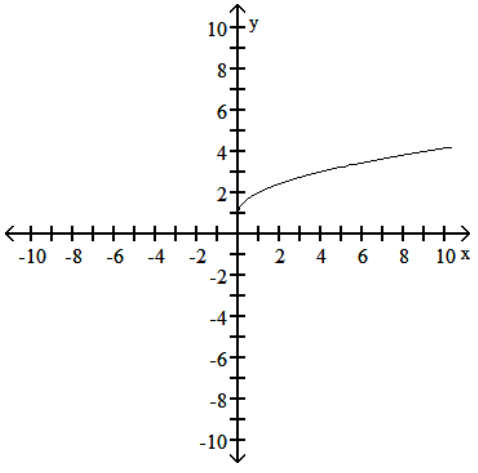
A)



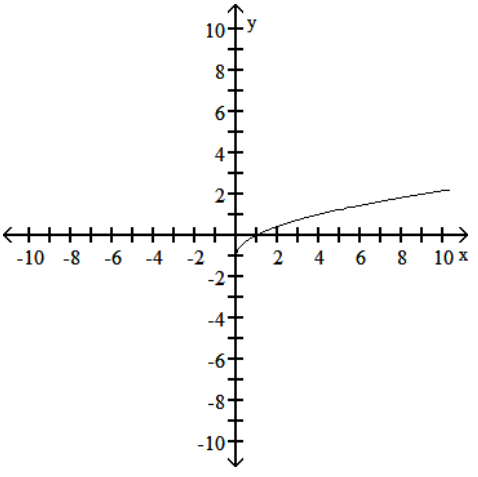
B)



C)



D)



Answer: A

Explanation: A)

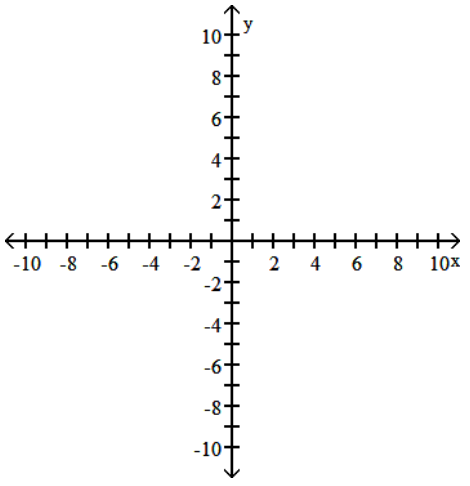
B)

C)

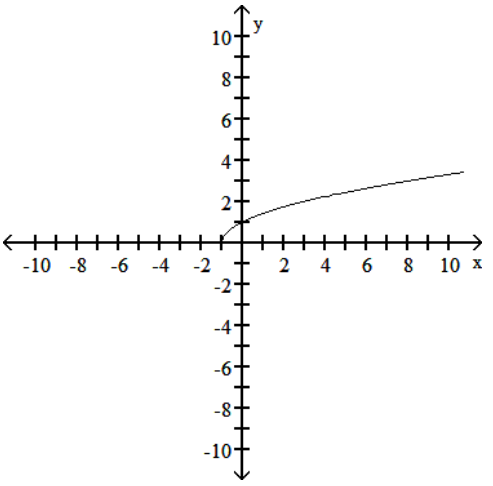
D)

30) $y = \sqrt{x} - 1$ 30) _____

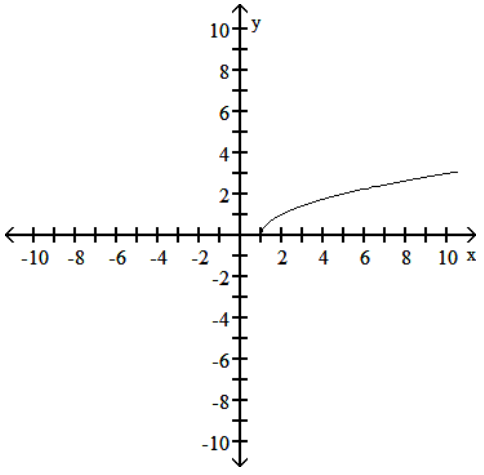
A)



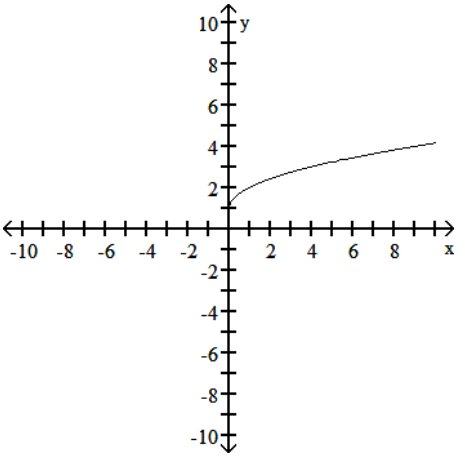
B)



C)



D)



Answer: A

Explanation: A)

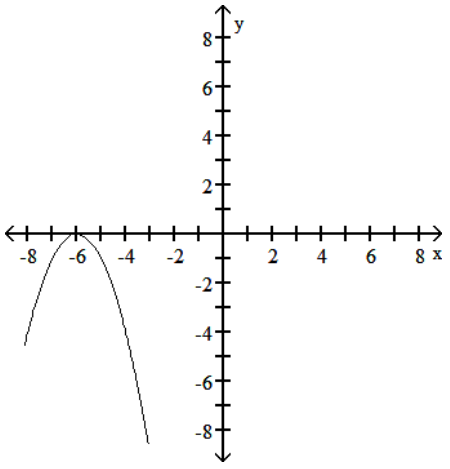
B)

C)

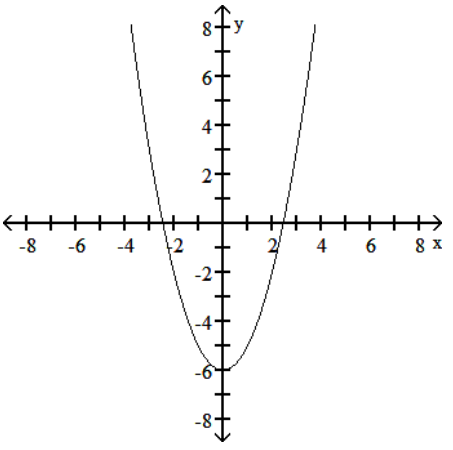
D)

31) $y = x^2 - 6$ 31) _____

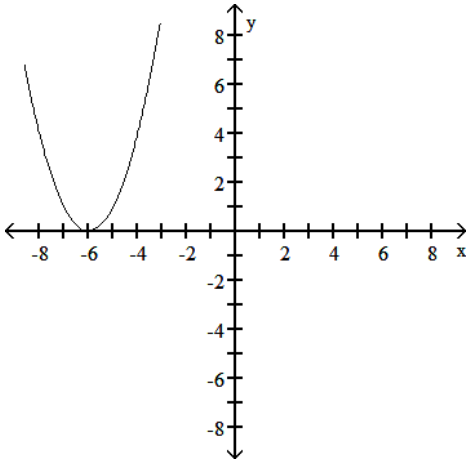
A)



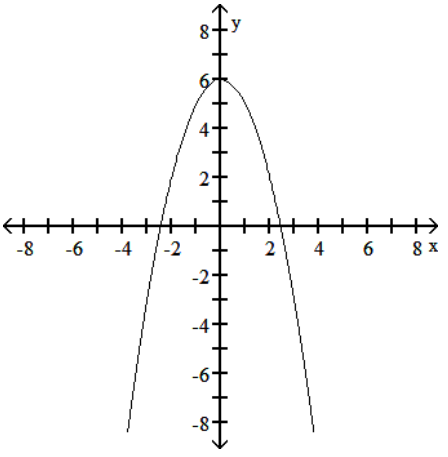
B)



C)



D)



Answer: B

Explanation: A)

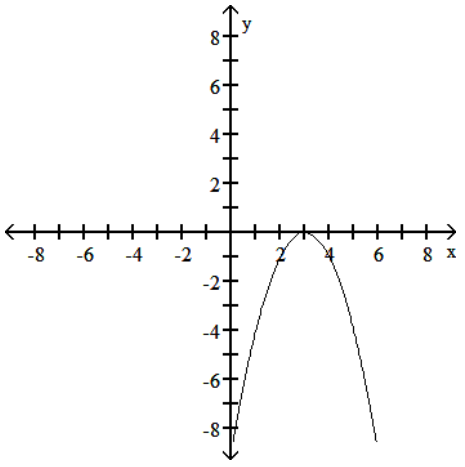
B)

C)

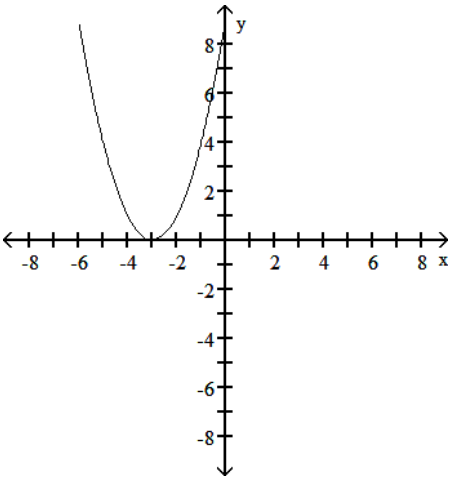
D)

32) $y = (x - 3)^2$ 32) _____

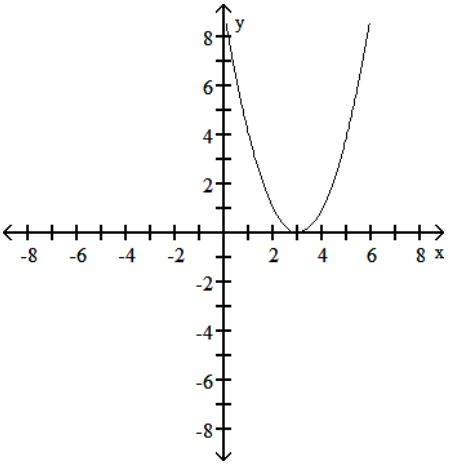
A)



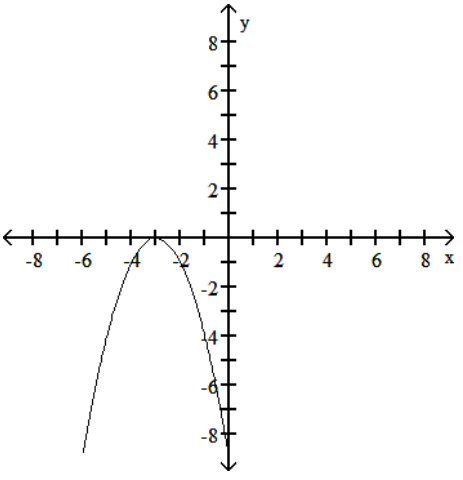
B)



C)



D)



Answer: C

Explanation: A)

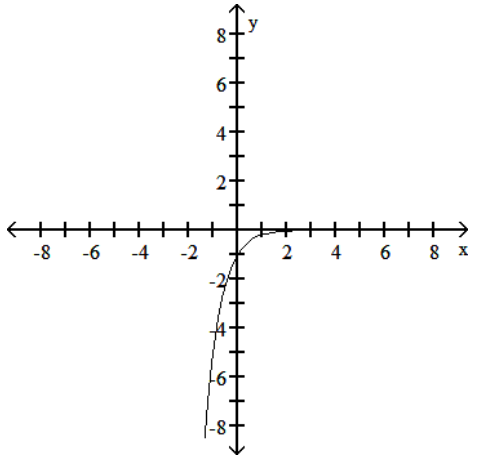
B)

C)

D)

Match the graph to the function.

33) 33) _____



A) $f(x) = 5^x$ B) $f(x) = 5^{-x}$ C) $f(x) = -5^x$ D) $f(x) = -5^{-x}$

Answer: D

Explanation: A)

B)

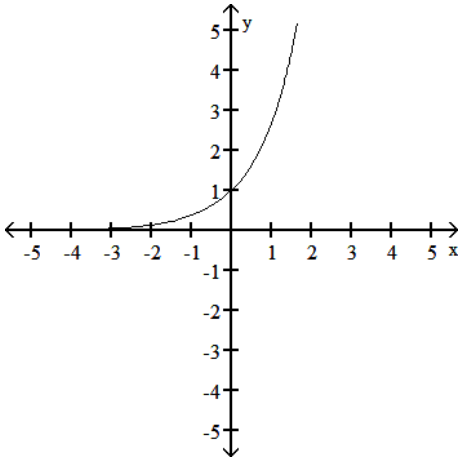
C)

D)

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

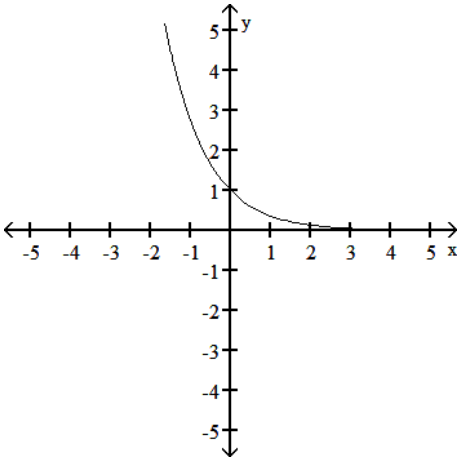
Provide an appropriate response.

34) $f(x) = a^x$ 34) _____



The graph of an exponential function with base a is given. Sketch the graph of $h(x) = a^{-x}$. Give the domain and range of h.

Answer:



domain: $(-\infty, \infty)$, range: $(0, \infty)$

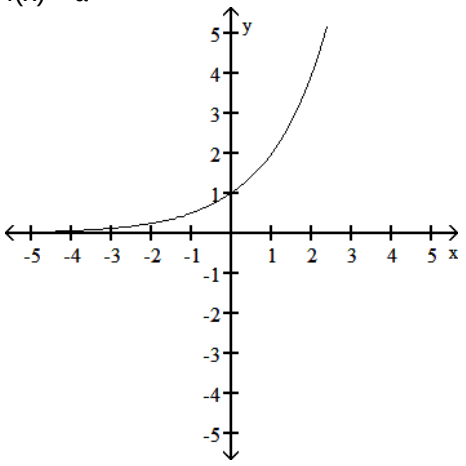
Explanation:

35) Explain how the graph of $y = (1/3)^x + 1$ can be obtained from the graph of $y = 3^x$. 35) _____

Answer: The graph is reflected over the y-axis and then shifted 1 units up.

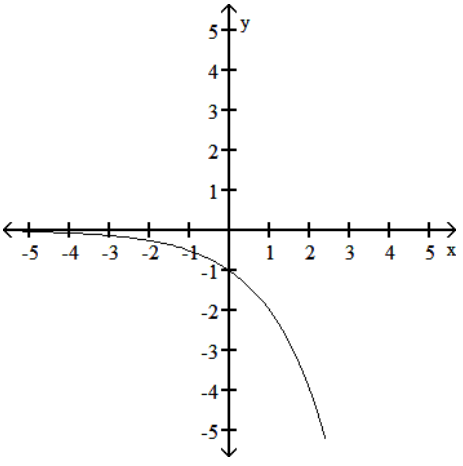
Explanation:

36) $f(x) = a^x$ 36) _____



The graph of an exponential function with base a is given. Sketch the graph of $g(x) = -a^x$. Give the domain and range of g.

Answer:



domain: $(-\infty, \infty)$, range: $(-\infty, 0)$

Explanation:

37) The graph of y = f(x) has an x-intercept of a and a y-intercept of b. What are the intercepts of the graph of y = f(-x)? 37) _____

Answer: x-intercept is -a ; y-intercept is b

Explanation:

38) Suppose the population of deer fluctuates over time. The population increases in the summer and decreases in the winter. It also varies over many years as well. If you looked at the graph of population versus time, would this relation be a function? Why or why not? 38) _____

Answer: This would be a function because at any given time there is only one possible population. Despite the fact that the population can reach the same level several times this is still a function, but for each point in time, there can be no more than one population.

Explanation:

39) Consider the linear function f(x) = 5x + 20. What is the domain and range of this function? Now, suppose the function represents the relationship between studying time and grades on an exam. The variable x represents the number of hours spent studying and f(x) represents the grade on the exam. Does this change the domain and range? If so, what is the new domain and range and why is it different? 39) _____

Answer: The domain is all real numbers and the range is the set of all real numbers. In the context of exam grades, the domain and range both become the set of nonegative real numbers. In this context, times and grades less than zero do not make sense.
Explanation:

40) Explain how the graph of $y = 4^{x - 3} + 2$ can be obtained from the graph of $y = 4^x$. 40) _____

Answer: The graph is shifted 3 units to the right and 2 units up.
Explanation:

41) A classmate claims that, if a function f(x) has a horizontal asymptote at y = w, then the function can only approach w but cannot actually equal w. Evaluate the classmate's claim. 41) _____

Answer: The classmate's claim is wrong. The horizontal asymptote tells us what the behavior of f(x) will be as x approaches the extremes of its domain, but puts no restrictions on the function in between the extremes.
Explanation:

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

Solve the problem.

42) An RC circuit is a simple electronic circuit consisting of a resistor, a capacitor, and a battery. The current i in the circuit at some time t after the battery is connected is $i = \frac{V}{R}e^{-t/(RC)}$, where V is the battery's voltage, R is the resistance, and C is the capacitance. Solve this equation for C. 42) _____

A) $C = \frac{Ve^{-t}}{R^2C}$ B) $C = \frac{t}{R \ln\left(\frac{V}{iR}\right)}$ C) $C = \frac{-R}{t \ln\left(\frac{iR}{V}\right)}$ D) $C = \frac{V}{R}e^{-t/(iR)}$

Answer: B
Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

43) 43) _____

x	y
-8	1
-8	-2
-1	-2
4	-6
8	9

A) Function B) Not a function

Answer: B
Explanation: A)
B)

Solve the problem.

44) Assume the cost of a car is $21,000. With continuous compounding in effect, find the number of years it would take to double the cost of the car at an annual inflation rate of 4%. Round to the nearest hundredth. 44) _____

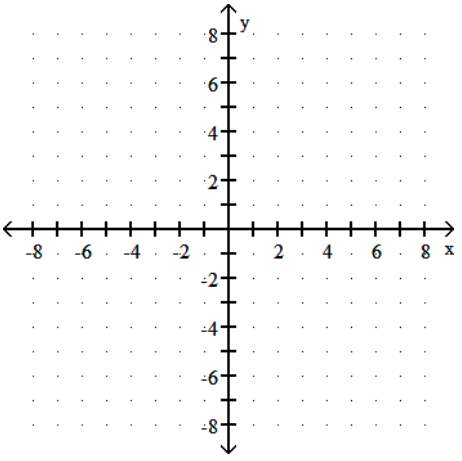
A) 17.33 yr B) 248.81 yr C) 2.49 yr D) 266.14 yr

Answer: A

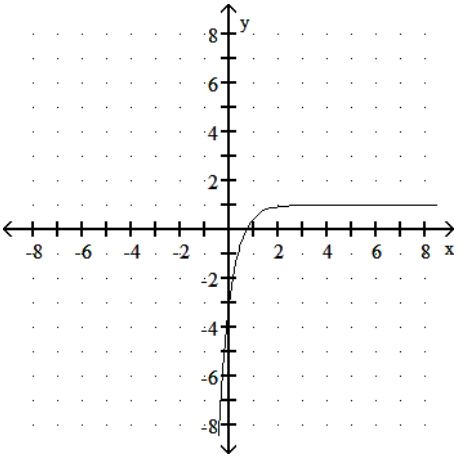
Explanation: A)
B)
C)
D)

Graph the function.

45) $y = 4e^{-2x} - 1$ 45) _____



A)



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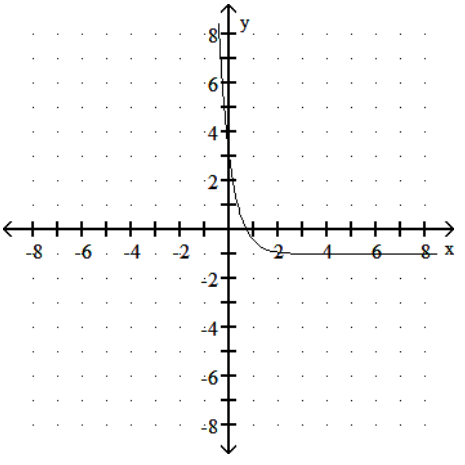
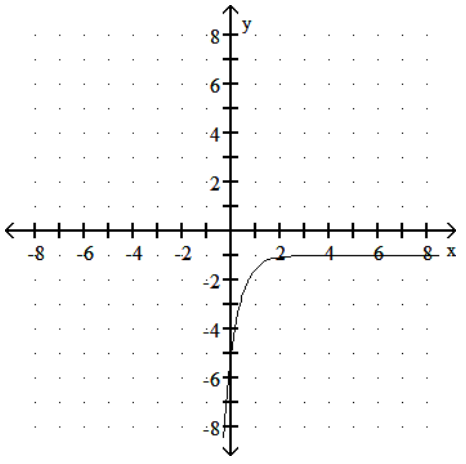
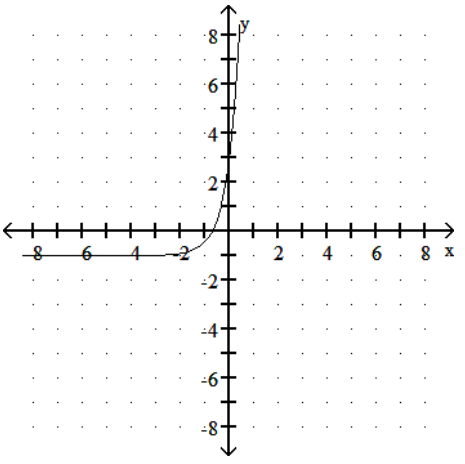


C)



D)



Answer: B
Explanation: A)
B)
C)
D)

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

46) $\log_{\sqrt{3}} 181.5$ 46) _____

A) 0.239 B) 0.106 C) 9.469 D) 4.734

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

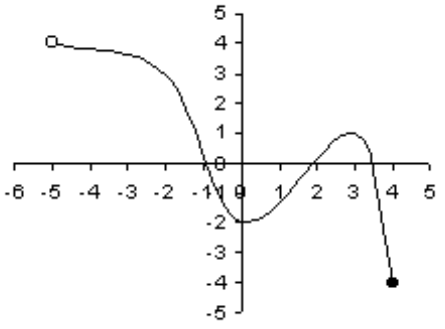
47) One hundred rats are being trained to run through a maze and are rewarded when they run through it correctly. Once a rat successfully runs the maze, it continues to run the maze correctly in all subsequent trials. The number of rats that run the maze *incorrectly* after t attempts is given approximately by $N(t) = 100e^{-.14t}$. Find the number of trials required such that only 45% of the rats are running the maze incorrectly. Round to the nearest trial. 47) _____

A) 27 trials B) 6 trials C) 23 trials D) 5 trials

Answer: B
Explanation: A)
B)
C)
D)

Give the domain and range of the function.

48) 48) _____

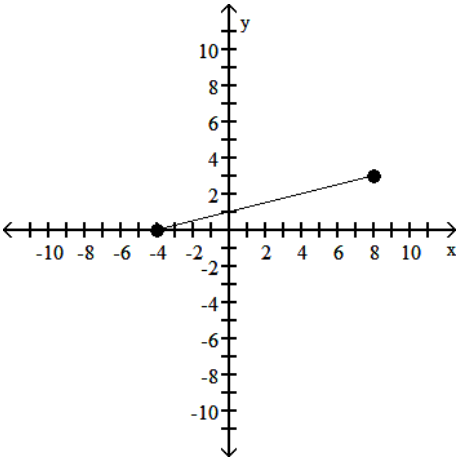


A) Domain (-5, 4] ; Range [-4, 4)
B) Domain [-4, 4) ; Range (-5, 4]
C) Domain [-5, 4] ; Range [-4, 4]
D) Domain (-5, 4) ; Range [-2, 4)

Answer: A

Explanation: A)
B)
C)
D)

49) 49) _____



A) Domain (-∞, ∞) ; Range (-∞, ∞)
B) Domain [-4, 8] ; Range [0, 3]
C) Domain {-4, 8} ; Range {0, 3}
D) Domain = (-4, 8) ; Range (0, 3)

Answer: B

Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

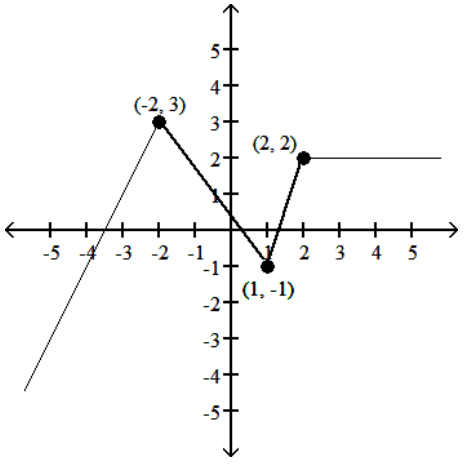
50) $f(x) = 5x^2$ 50) _____

A) Even
B) Odd
C) Neither

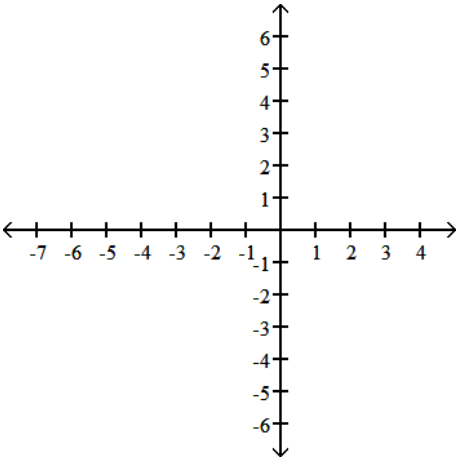
Answer: A

Explanation: A)
B)
C)

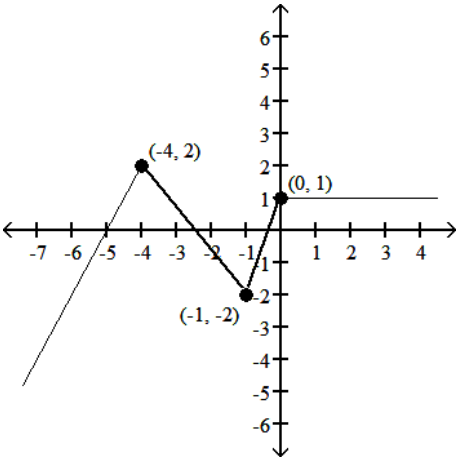
Using the graph below, sketch the graph of the given function.



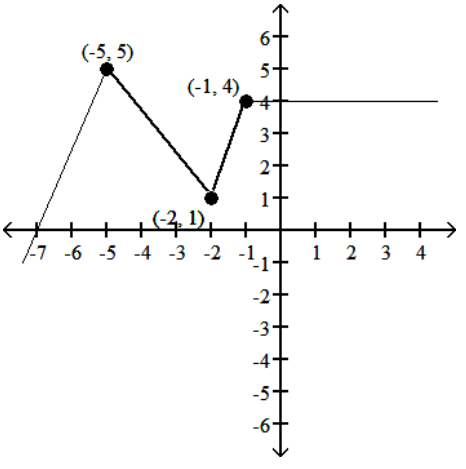
51) y = - f(x) 51) _____



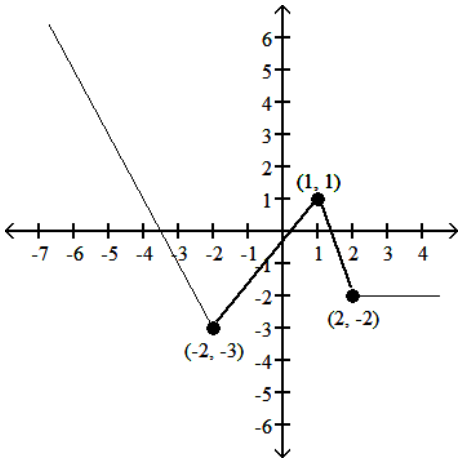
A)



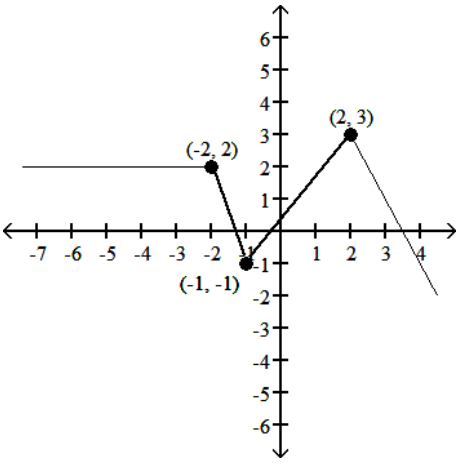
B)



C)



D)



Answer: C

Explanation: A)

B)

C)

D)

Solve the problem.

52) An economist predicts that the buying power B(x) of a dollar x years from now will decrease according to the formula $B(x) = 0.63^x$. How much will today's dollar be worth in 2 years? Round to the nearest cent. 52) _____

A) $0.40 B) $0.91 C) $1.55 D) $1.26

Answer: A

Explanation: A)

B)

C)

D)

53) If the average cost per unit $\overline{C}(x)$ to produce x units of plywood is given by $\overline{C}(x) = \frac{1200}{x + 40}$, what do 200 units cost? 53) _____

A) $6000.00 B) $50.00 C) $1000.00 D) $1199.80

Answer: C

Explanation: A)

B)

C)

D)

54) Newton's law of cooling states that the temperature f(t) of a body at time t is given by: 54) _____

$f(t) = T_0 + Ce^{-kt}$, where C and k are constants and T_0 is the temperature of the environment in which the object rests. If

C = 280 and k = 0.15 and t is in minutes, how long will it take for a glass baking dish containing brownies to cool to a comfortable-to-touch temperature of 92°F in a room that is at 70°F? Round your answer to the nearest minute.

A) 14 min B) 21 min C) 12 min D) 17 min

Answer: D

Explanation: A)
B)
C)
D)

55) A state park charges $12 per day or fraction of a day to rent a tent site, plus a fixed $7 park maintenance fee. Let T(x) represent the cost to stay in a tent site for x days. Find $T\left(7\frac{3}{10}\right)$. 55) _____

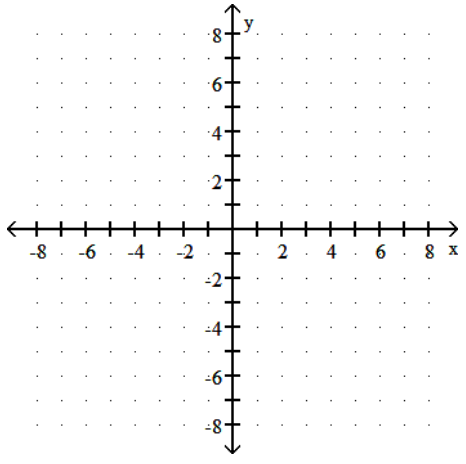
A) $84.00 B) $91.00 C) $103.00 D) $94.60

Answer: C

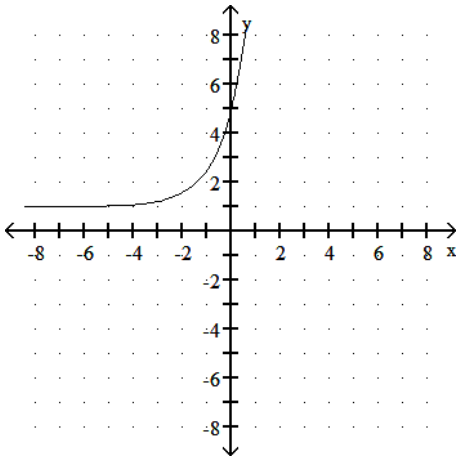
Explanation: A)
B)
C)
D)

Graph the function.

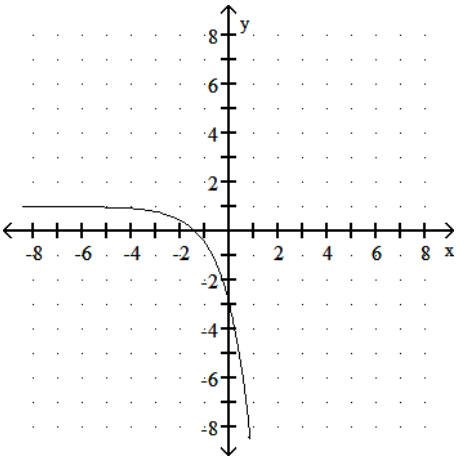
56) $y = 4e^x + 1$ 56) _____



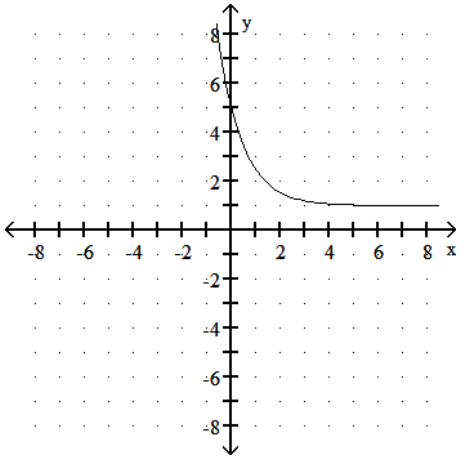
A)



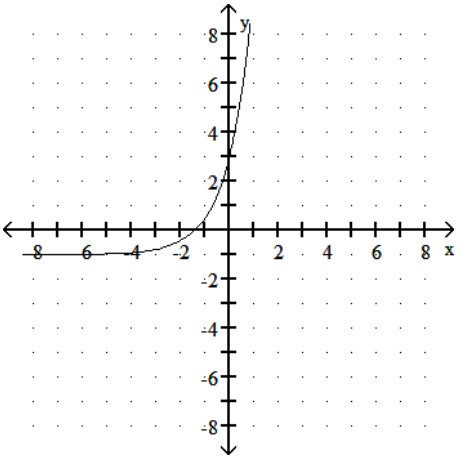
B)



C)



D)



Answer: A
Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

57) $\log_2 16 = 4$ 57) _____

A) $2^4 = \frac{1}{16}$ B) $2^4 = 16 + 1$ C) $2^4 = 16$ D) $2^4 = 4$

Answer: C
Explanation: A)
B)
C)
D)

Solve the equation.

58) $e^{-3x} = (e^{7})^{1 - x}$ 58) _____

A) $\frac{1}{4}$ B) 0 C) $-\frac{7}{4}$ D) $\frac{7}{4}$

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

59) The number of books in a small library increases according to the function $B = 3100e^{0.03t}$, where t is measured in years. How many books will the library have after 7 years? Round to the nearest book. 59) _____

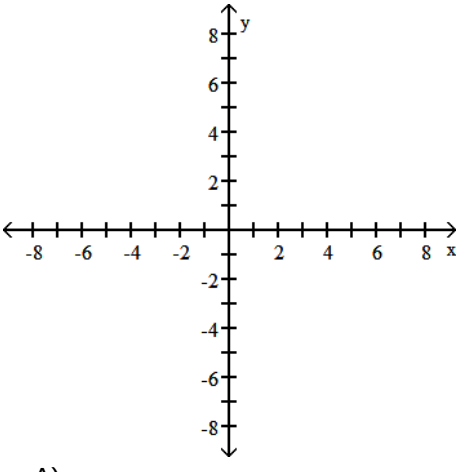
A) 2101 books B) 5028 books C) 4838 books D) 3824 books

Answer: D

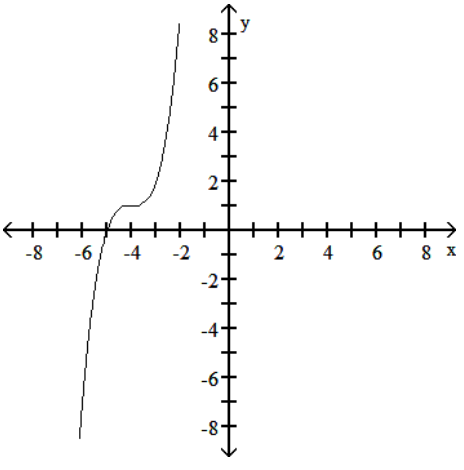
Explanation: A)
B)
C)
D)

Use the principles of translating and reflecting to graph the function.

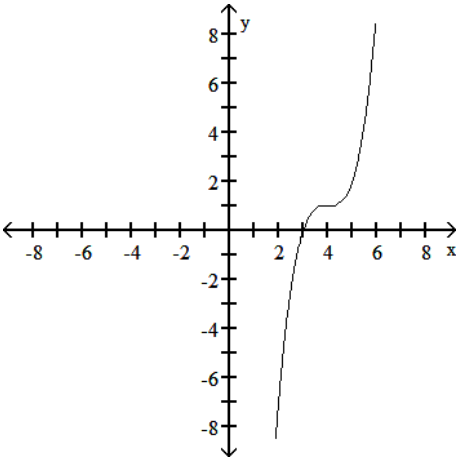
60) $f(x) = (x + 4)^3 - 1$ 60) _____



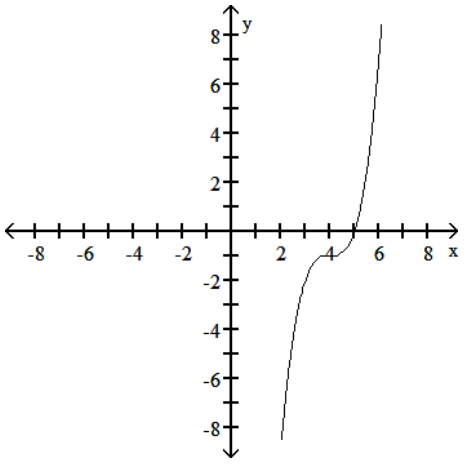
A)



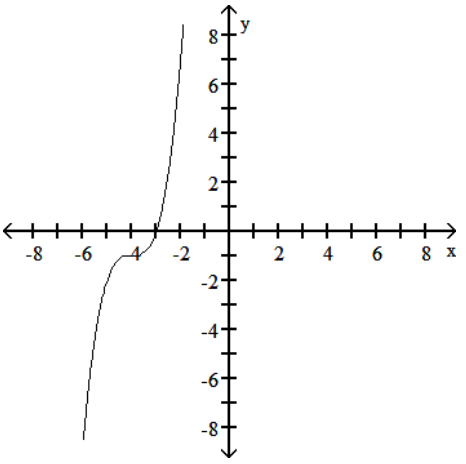
B)



C)



D)



Answer: D
Explanation: A)
B)
C)
D)

Solve the equation.

61) $5^x = \frac{1}{125}$ 61) _____

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

Answer: B
Explanation: A)
B)
C)
D)

Solve the problem.

62) A certain noise has intensity $3.55 \times 10^8 \, I_0$. What is the decibel rating of this sound? Use the formula $D = 10 \log I_0$, where I_0 is a faint threshold sound, and I is the intensity of the sound." 62) _____

A) 197 decibels B) 9 decibels C) 86 decibels D) 76 decibels

Answer: C
Explanation: A)
B)
C)
D)

63) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -13t^2 + 416t$. After how many seconds does it reach its maximum height? 63) _____

A) 26 sec B) 13 sec C) 16 sec D) 32 sec

Answer: C
Explanation: A)
B)
C)
D)

64) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope has a half-life of approximately 900 years. How many years would be required for a given amount of this isotope to decay to 30% of that amount? 64) _____

A) 463 yr B) 1563 yr C) 1533 yr D) 630 yr

Answer: B

Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

65) $\ln x = 2$ 65) _____

A) $e^x = 2$ B) $e^2 = x$ C) $2^e = x$ D) $x^2 = e$

Answer: B

Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

66) Let $\log_b A = 3.508$ and $\log_b B = 0.259$. Find $\log_b \frac{A}{B}$. 66) _____

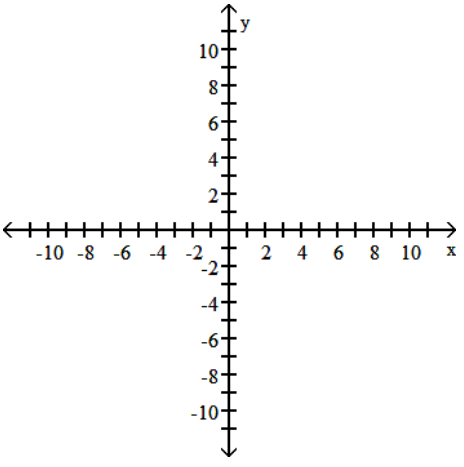
A) 3.508 B) 3.249 C) 3.767 D) 0.909

Answer: B

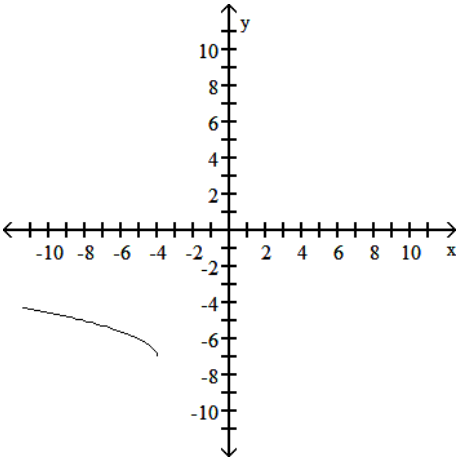
Explanation: A)
B)
C)
D)

Graph the function.

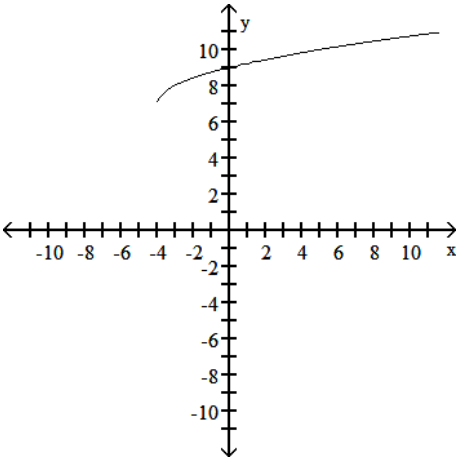
67) $f(x) = \sqrt{x + 4} + 7$ 67) _____



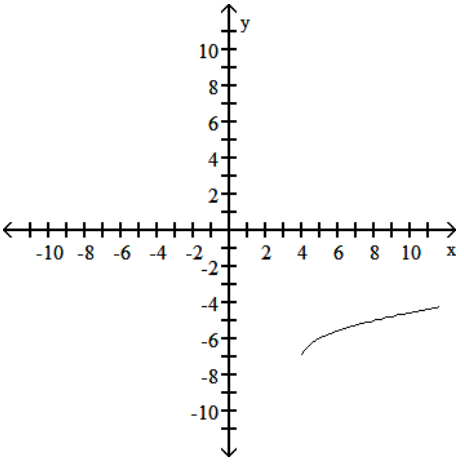
A)



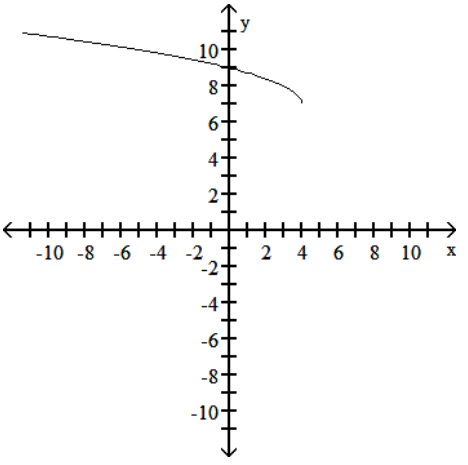
B)



C)



D)



Answer: B

Explanation: A)

B)

C)

D)

Give the domain of the function.

68) $g(z) = \sqrt{1 - z^2}$ 68) _____

A) $(-1, 1)$ B) $(-\infty, \infty)$ C) $[0, \infty)$ D) $[-1, 1]$

Answer: D

Explanation: A)

B)

C)

D)

Solve the problem.

69) The number of bacteria growing in an incubation culture increases with time according to $B = 6500(3)^x$, where x is time in days. Find the number of bacteria when x = 0 and x = 2. 69) _____

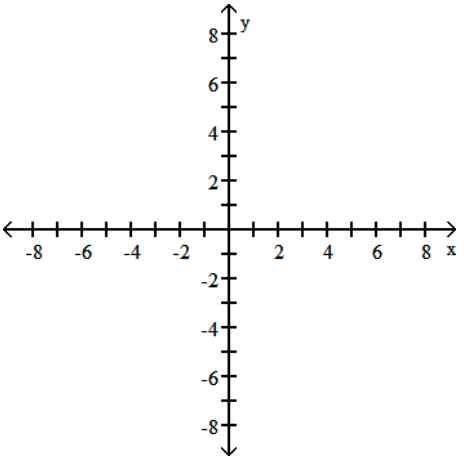
A) 6500 bacteria, 175,500 bacteria
B) 6500 bacteria, 58,500 bacteria
C) 6500 bacteria, 39,000 bacteria
D) 19,500 bacteria, 58,500 bacteria

Answer: B

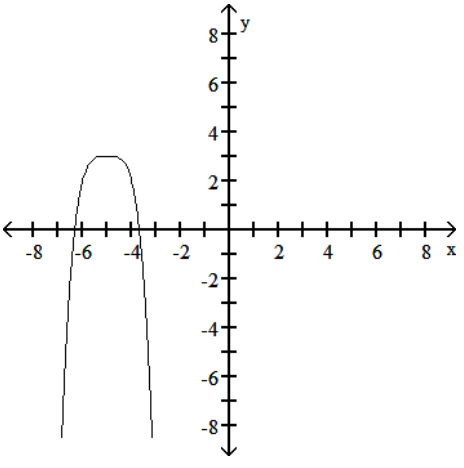
Explanation: A)
B)
C)
D)

Use the principles of translating and reflecting to graph the function.

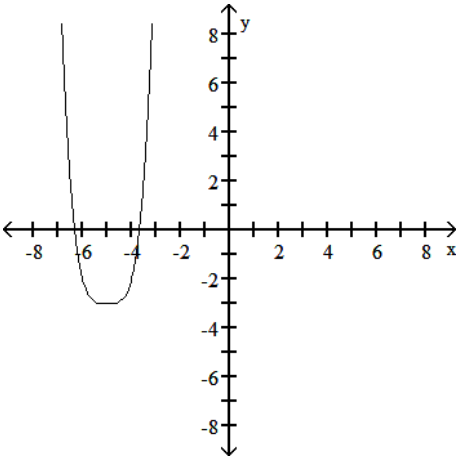
70) $f(x) = -(x - 5)^4 + 3$ 70) _____



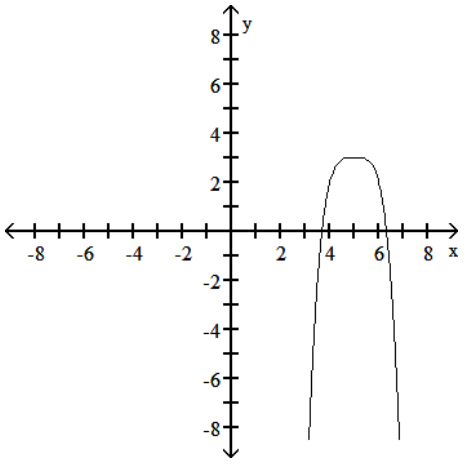
A)



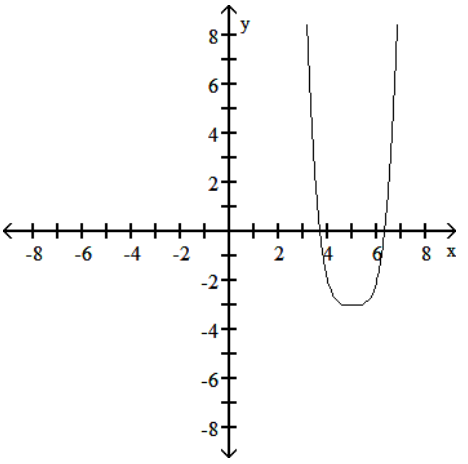
B)



C)



D)



Answer: C
Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

71) log 1000 = 3 71) _____

A) $10^3 = 10{,}000$ B) $10^3 = 1000$ C) $10^3 = 3$ D) $10^3 = \frac{1}{1000}$

Answer: B
Explanation: A)
B)
C)
D)

Solve the equation.

72) $5^{-|x|} = \frac{1}{25}$ 72) _____

A) 2, -2 B) 2 C) 1, -1 D) 5, -5

Answer: A
Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

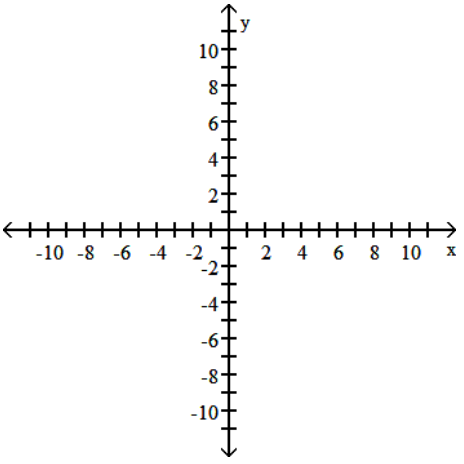
73) Let $\log_b A = 1.445$ and $\log_b B = 0.263$. Find $\log_b AB$. 73) _____

A) 0.380 B) 5.494 C) 1.182 D) 1.708

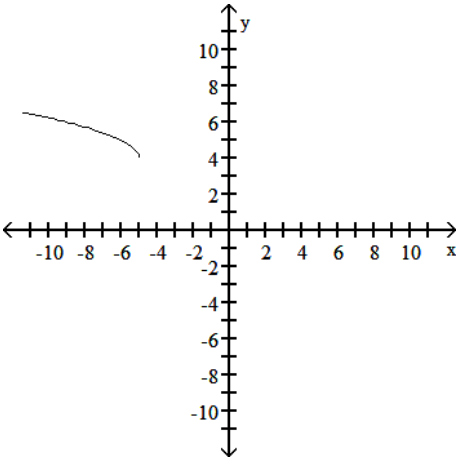
Answer: D
Explanation: A)
B)
C)
D)

Graph the function.

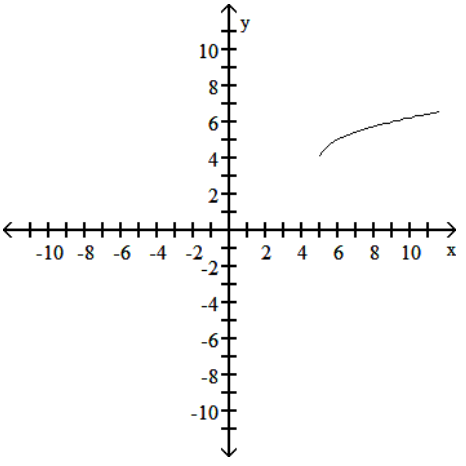
74) $f(x) = \sqrt{5 - x} + 4$ 74) _____



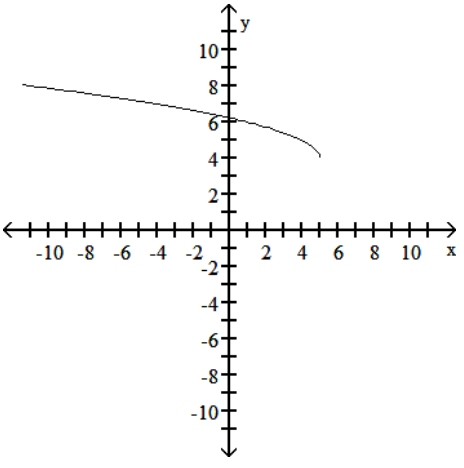
A)



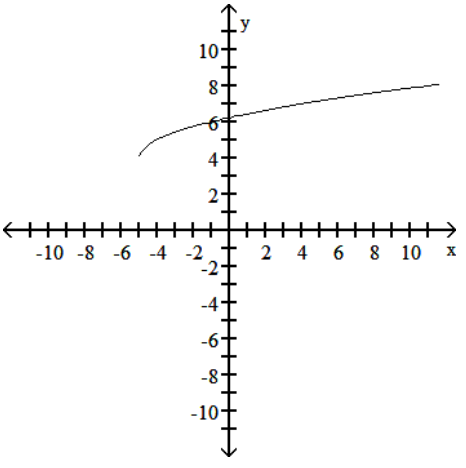
B)



C)



D)



Answer: C

Explanation: A)

B)

C)

D)

Solve the equation.

75) $\log_y 14 = 3$ 75) _____

A) $\frac{14}{3}$ B) $14^{1/3}$ C) $3^{1/14}$ D) 14^3

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

76) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. Find the Richter scale rating of an earthquake with an amplitude of $10^{6.2}\, I_0$. 76) _____

A) 6.2 B) 14.3 C) 16.2 D) 3.8

Answer: A

Explanation: A)
B)
C)
D)

77) What is the maximum area that can be enclosed by 360 feet of fencing? 77) _____

A) 8100 sq ft B) 14,400 sq ft C) 16,200 sq ft D) 7200 sq ft

Answer: A

Explanation: A)
B)
C)
D)

Solve the equation.

78) $4^{(12 - 4x)} = 256$ 78) _____

A) 3 B) 2 C) -2 D) 64

Answer: B

Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

79) $\log 1000 = 3$ 79) _____

A) $10^3 = 1000$ B) $1000^3 = 10$ C) $3^{10} = 1000$ D) $10^{1000} = 3$

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

80) If an object is thrown upward with an initial velocity of 11 feet per second, then its height is given by $h = -11t^2 + 44t$. After how many seconds does it hit the ground? 80) _____

A) 22 sec B) 11 sec C) 2 sec D) 4 sec

Answer: D

Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

81) $y = x^2 + 4$ 81) _____

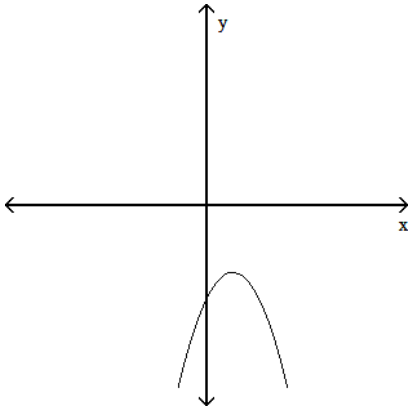
A) Function B) Not a function

Answer: A

Explanation: A)
B)

Decide whether the graph represents a function.

82) 82) _____



A) Function B) Not a function

Answer: A

Explanation: A)
B)

Solve the problem.

83) A function that might describe the entire Laffer curve is $y = 0.5x(100 - x)(10000 - x^2)$ where y is the government revenue in hundreds of thousands of dollars from a tax of x percent, with the function valid for $0 \le x \le 100$. Find the revenue from a tax rate of 40%. Round your answer to the nearest billion. 83) _____

A) $1033 billion B) $908 billion C) $1008 billion D) $978 billion

Answer: C

Explanation: A)
B)
C)
D)

Write the exponential equation in logarithmic form.

84) $5^3 = 125$ 84) _____

A) $\log_5 125 = 3$ B) $\log_3 125 = 5$ C) $\log_{125} 5 = 3$ D) $\log_5 3 = 125$

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

85) If the average cost per unit $\overline{C}(x)$ to produce x units of plywood is given by $\overline{C}(x) = \frac{1500}{x + 50}$, what is the 85) _____

unit cost for 10 units?

A) \$150.00 B) \$100.00 C) \$25.00 D) \$3.00

Answer: C

Explanation: A)
B)
C)
D)

Solve the equation.

86) $\log (5 + x) - \log (x - 4) = \log 2$ 86) _____

A) -13 B) $\frac{1}{2}$ C) 13 D) No solution

Answer: C

Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

87) $80.85^x = 50.34^x$ 87) _____

A) 0.000 B) 0.379 C) -2.972 D) -1.386

Answer: A

Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

88) $\ln e^{1/5} = \frac{1}{5}$ 88) _____

A) $e^{1/5} = \frac{1}{5}$ B) $e^5 = e^{1/5}$ C) $\ln \frac{1}{5} = e^{1/5}$ D) $e^{1/5} = e^{1/5}$

Answer: D

Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

89) $\log_8 32$ 89) _____

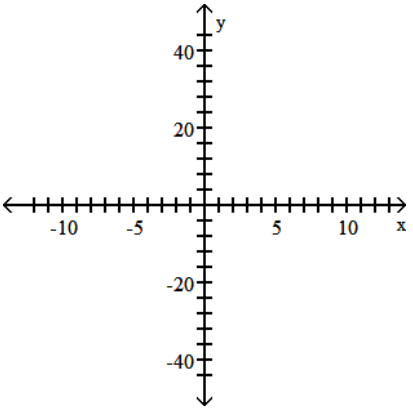
A) $\frac{5}{3}$ B) $\frac{5}{4}$ C) $\frac{3}{2}$ D) $\frac{4}{3}$

Answer: A

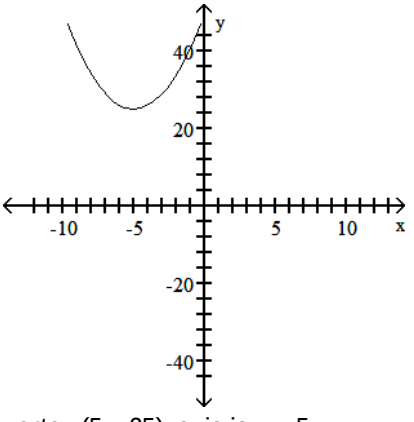
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

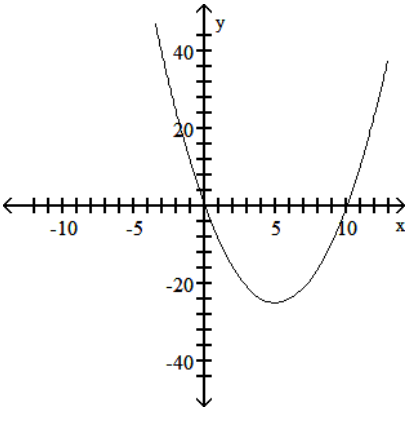
90) $f(x) = x^2 + 10x$ 90) _____



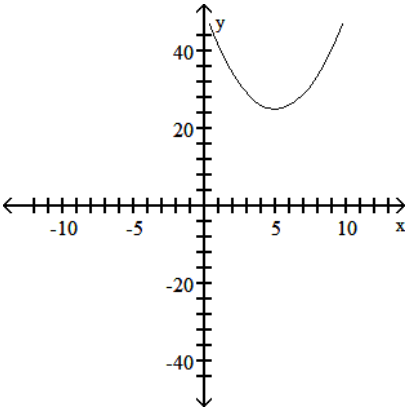
A) vertex (-5, 25); axis is x = -5;
no x-intercepts; y-intercept is 50



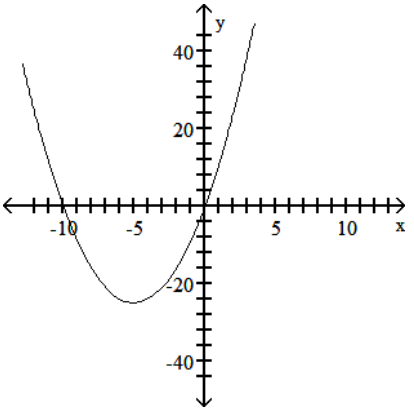
B) vertex (5, -25); axis is x = 5;
x-intercepts are 0 and 10; y-intercept is 0



C) vertex (5, 25); axis is x = 5;
no x-intercepts; y intercept is 50



D) vertex (-5, -25); axis is x = -5;
x-intercepts are 0 and - 10; y-intercept is 0



Answer: D
Explanation: A)
B)
C)
D)

Find the domain of the function.

91) f(x) = log (x - 5) 91) _____

A) x > 1 B) x > 5 C) x > 0 D) x > -5

Answer: B
Explanation: A)
B)
C)
D)

Give the domain of the function.

92) $f(x) = |6x + 3|$ 92) _____

A) $\left[-\frac{1}{2}, \infty\right)$

B) $[0, \infty)$

C) $\left(-\infty, -\frac{1}{2}\right] \cup \left(-\frac{1}{2}, \infty\right)$

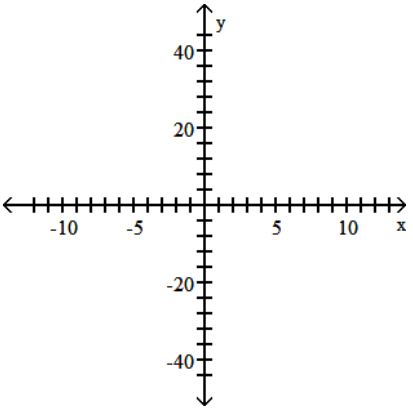
D) $(-\infty, \infty)$

Answer: D

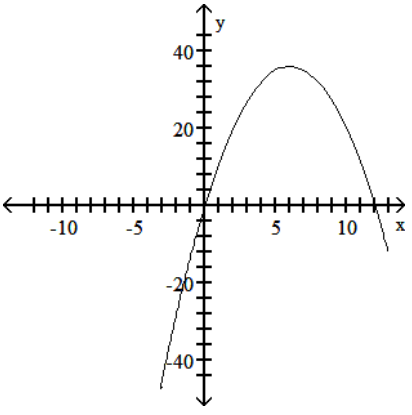
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

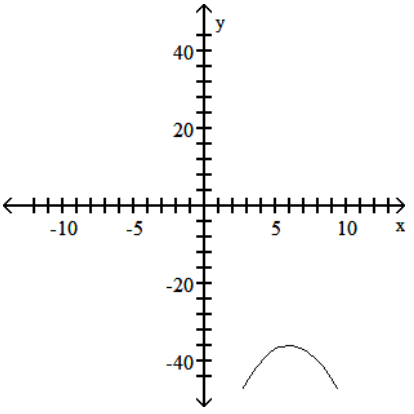
93) $f(x) = -x^2 - 12x$ 93) _____



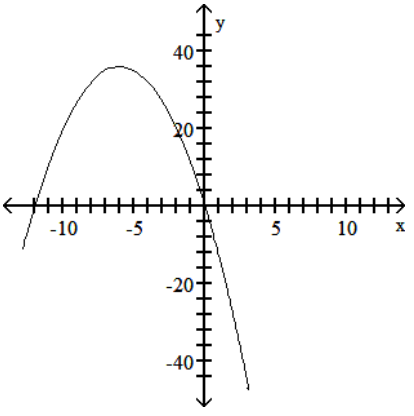
A) vertex (6, 36); axis is x = 6;
x-intercepts are 0 and 12; y-intercept is 0



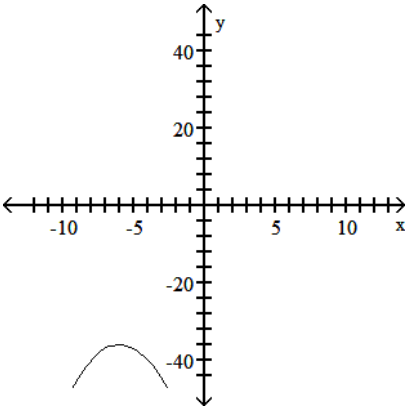
B) vertex (6, -36); axis is x = 6;
no x-intercepts; y-intercept is -72



C) vertex (-6, 36); axis is x = -6;
x-intercepts are 0 and -12; y-intercept is 0



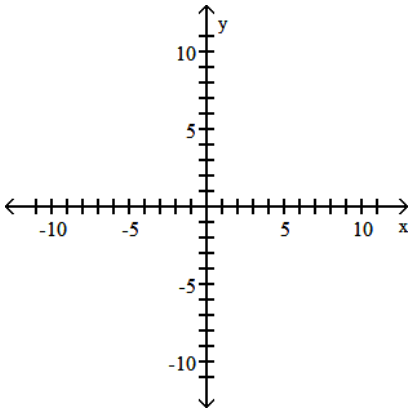
D) vertex (-6, -36); axis is x = -6;
no x-intercepts; y-intercept is -72



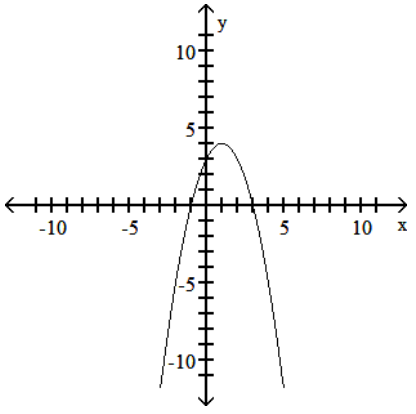
Answer: C

Explanation: A)
B)
C)
D)

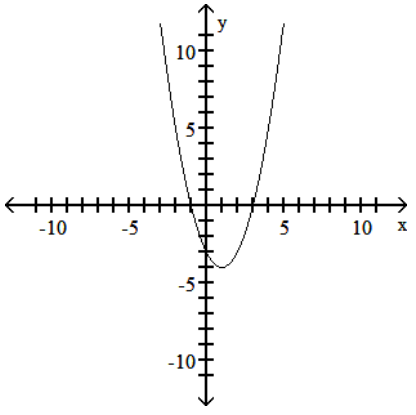
94) $f(x) = -x^2 - 2x + 3$ 94) _____



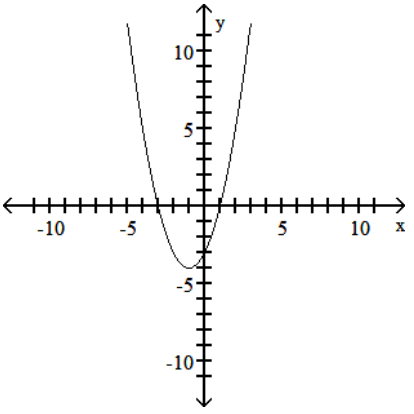
A) vertex (1, 4); axis is x = 1;
x-intercepts are -1 and 3; y-intercept is 3



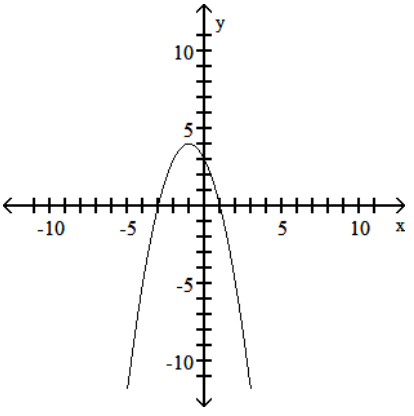
B) vertex (1, -4); axis is x = 1;
x-intercepts are -1 and 3; y-intercept is -3



C) vertex (-1, -4); axis is x = -1;
x-intercepts are 1 and - 3; y-intercept is -3



D) vertex (-1, 4); axis is x = -1;
x-intercepts are 1 and - 3; y-intercept is 3



Answer: D
Explanation: A)
B)
C)
D)

Solve the equation.

95) $\log_3 x = 4$ 95) _____

A) 12 B) 64 C) 81 D) 1.26

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

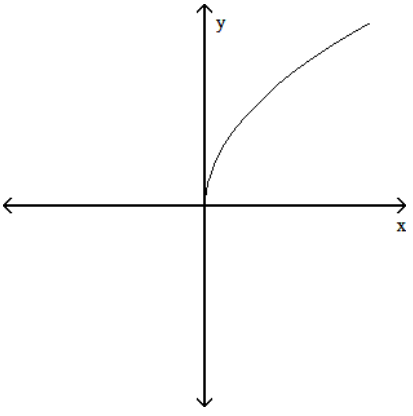
96) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. An earthquake measured 8.5 on the Richter scale. Express this reading in terms of I_0. 96) _____

A) 251,188,643 I_0 B) 316,227,766 I_0 C) 31,622,777 I_0 D) 4910 I_0

Answer: B
Explanation: A)
B)
C)
D)

Decide whether the graph represents a function.

97) 97) _____

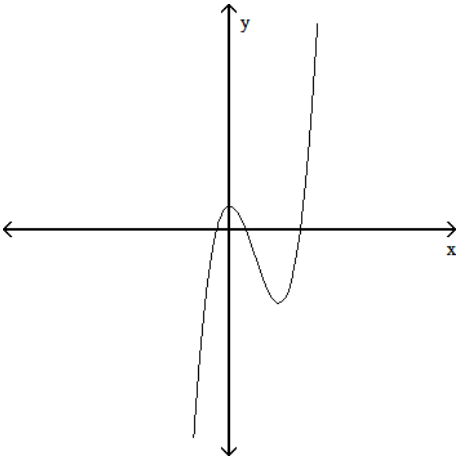


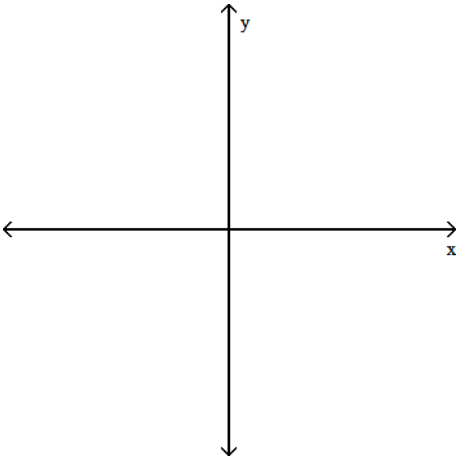
A) Function B) Not a function

Answer: A
Explanation: A)
B)

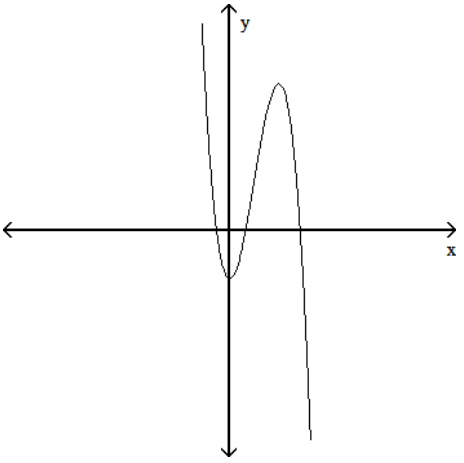
Graph the indicated new function, given the graph for y = f(x).

98) y = af(x), where a satisfies 1 < a 98) _____

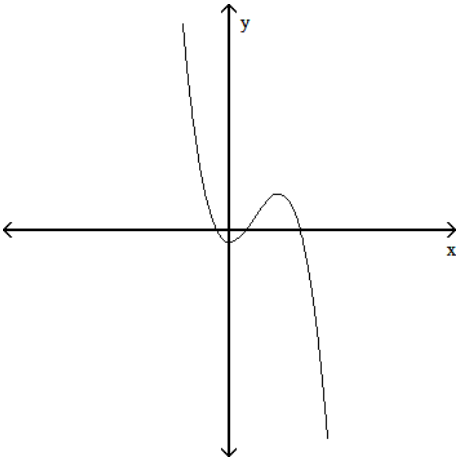




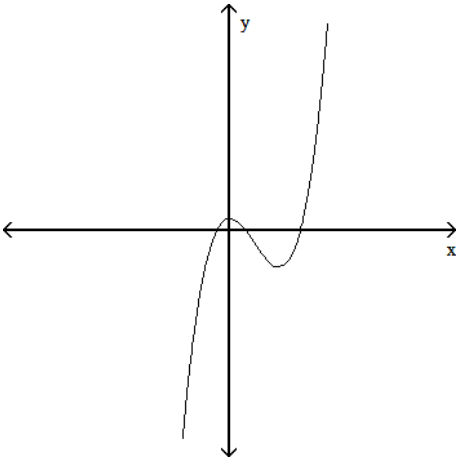
A)



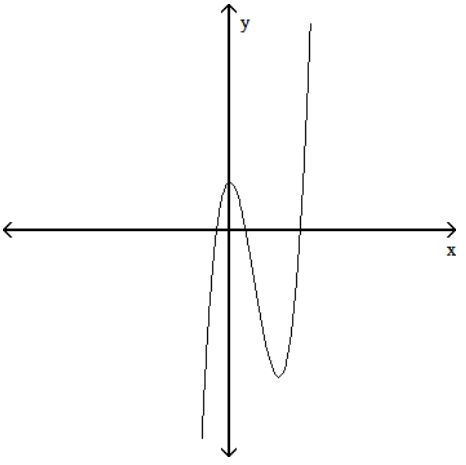
B)



C)



D)



Answer: D

Explanation: A)

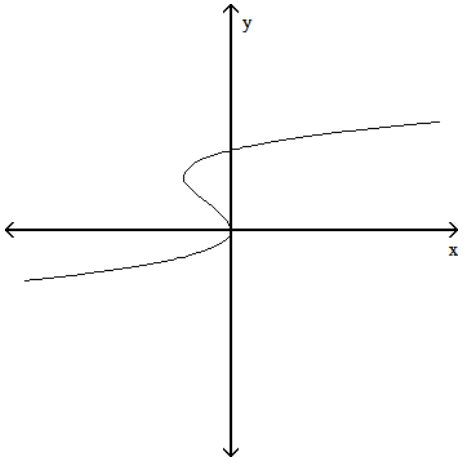
B)

C)

D)

Decide whether the graph represents a function.

99) 99) _____



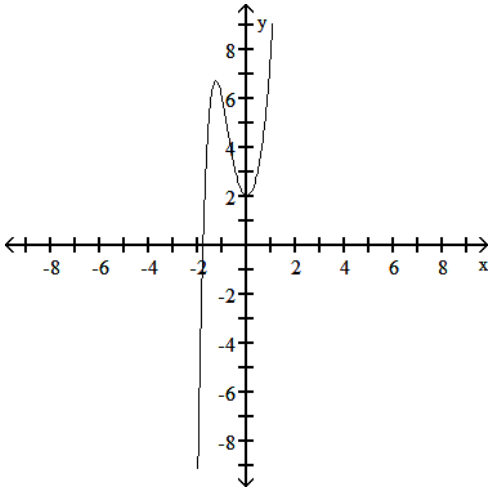
A) Function B) Not a function

Answer: B

Explanation: A)
B)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

100) 100) _____



A) Can't identify degree; + B) Degree is even; -

C) Degree is odd; + D) Degree is even; +

Answer: C

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

101) $y = \frac{4x}{x + 3}$ 101) _____

A) Vertical asymptote at x = -3; no horizontal asymptote
B) Vertical asymptote at x = 4; horizontal asymptote at y = -3
C) Vertical asymptote at x = -3; horizontal asymptote at y = 4
D) Vertical asymptote at x = 3; horizontal asymptote at y = 4

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

102) The polynomial function $A(x) = -0.015x^3 + 1.05x$ gives the alcohol level in an average person's blood x hours after drinking 8 oz of 100-proof whiskey. If the level exceeds 1.5, a person is legally drunk. Would a person be drunk after 7 hours? 102) _____

A) Yes B) No

Answer: A
Explanation: A)
B)

103) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 4x^2 - 328x + 72$, where x is the number of watches repaired. How many watches should he repair to produce the lowest cost? 103) _____

A) 41 watches B) 72 watches C) 288 watches D) 164 watches

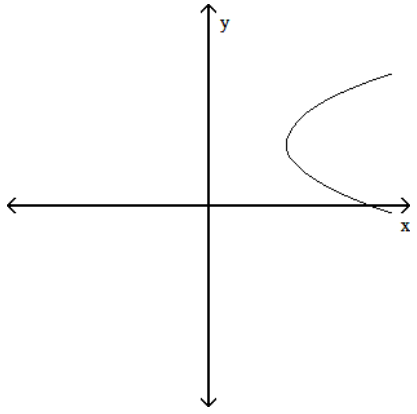
Answer: A
Explanation: A)
B)
C)
D)

104) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by $y = \frac{62{,}500}{x + 125}$. What is the cost per ton for x = 20? 104) _____

A) $25.00 B) $3000.00 C) $431.03 D) $3125.00

Answer: C
Explanation: A)
B)
C)
D)

Decide whether the graph represents a function.

105) 

105) _____

A) Function B) Not a function

Answer: B

Explanation: A)

B)

Classify the function as even, odd, or neither.

106) $f(x) = \frac{x}{x^2 - 4}$

106) _____

A) Even B) Odd C) Neither

Answer: B

Explanation: A)

B)

C)

Solve the problem.

107) The table shows the estimated number of pounds of summer flounder harvested in North Carolina each year from 1992-1998. Let y = f(x) represent the number of flounder (in millions of pounds) and x represent the years. What is the dependent variable? 107) _____

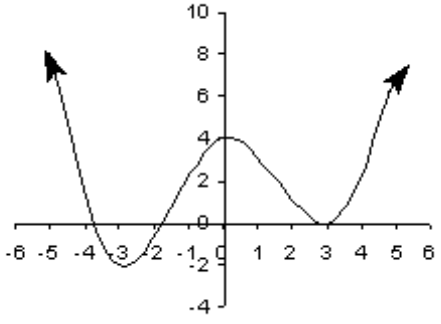
Year	Millions of lb of Summer Flounder
1992	2.6
1993	3.1
1994	3.6
1995	4.6
1996	4.2
1997	1.5
1998	3.0

A) None of these are correct.
B) Years
C) Millions of pounds of flounder
D) The number of hurricanes striking the N.C. coast in the given year

Answer: C
Explanation: A)
B)
C)
D)

Give the domain and range of the function.

108) 108) _____

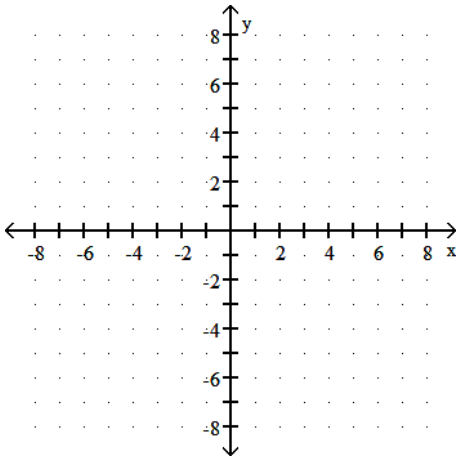


A) Domain (-5, 5) ; Range [-2, 8)
B) Domain (-∞, ∞) ; Range [0, ∞)
C) Domain (-∞, ∞) ; Range [-2, 4]
D) Domain (-∞, ∞) ; Range [-2, ∞)

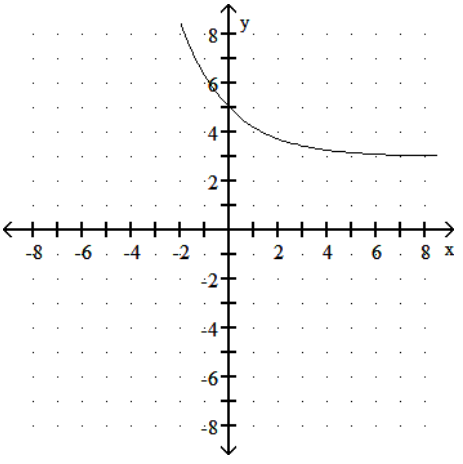
Answer: D
Explanation: A)
B)
C)
D)

Graph the function.

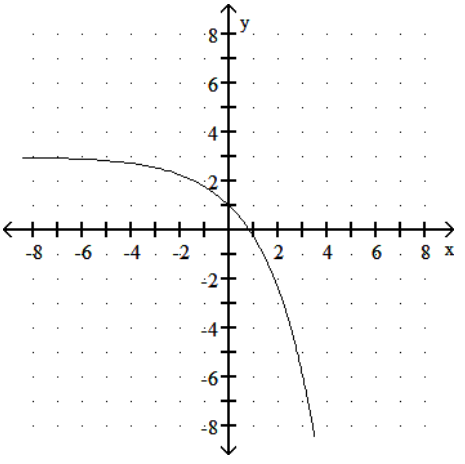
109) $y = -2e^{-x/2} + 3$ 109) _____



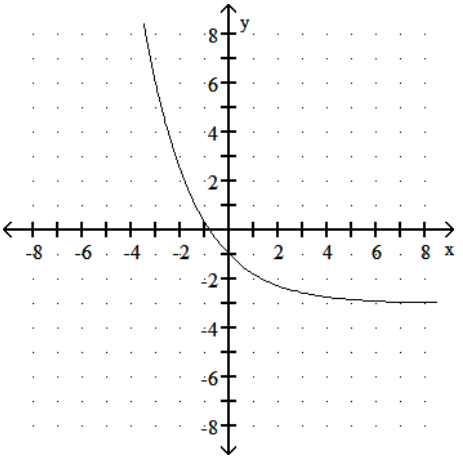
A)



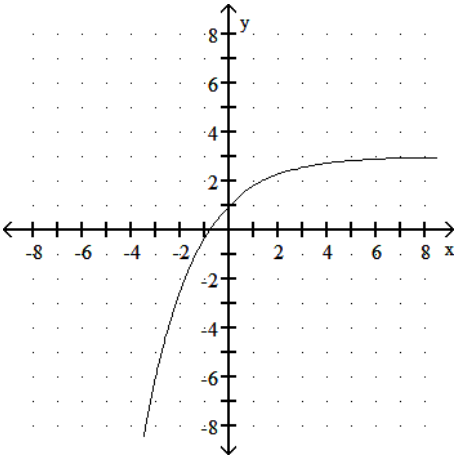
B)



C)



D)



Answer: D

Explanation: A)

B)

C)

D)

Solve the problem.

110) At what interest rate must $4700 be compounded annually to equal $6957.15 after 10 years? Round to the nearest percent. 110) _____

A) 3% B) 4% C) 5% D) 6%

Answer: B

Explanation: A)
B)
C)
D)

111) The number of books in a small library increases according to the function $B = 8800e^{0.04t}$, where t is measured in years. How many books will the library have after 6 years? 111) _____

A) 12,559 books B) 11,187 books C) 5454 books D) 15,293 books

Answer: B

Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

112) $4^x = 9$ 112) _____

A) 1.585 B) 0.631 C) 0.811 D) 2.250

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

113) The population growth of an animal species is described by $F(t) = 600 + 80 \log_3 (2t + 1)$ where t is measured in months. Find the population of this species in an area 13 month(s) after the species is introduced. 113) _____

A) 2760 B) 840 C) 430 D) 1400

Answer: B

Explanation: A)
B)
C)
D)

114) The amount of particulate matter left in solution during a filtering process decreases by the equation $P = 700(2)^{-0.8n}$, where n is the number of filtering steps. Find the amounts left for n = 0 and n = 5. (Round to the nearest whole number.) 114) _____

A) 1400, 44 B) 700, 22 C) 700, 44 D) 700, 11,200

Answer: C

Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

115) $\log_6 \frac{13}{7}$ 115) _____

A) $\log_3 13 - \log_3 7$ B) $\log_6 13 - \log_6 7$ C) $\log_6 13 + \log_6 7$ D) $\log_6 7 - \log_6 13$

Answer: B
Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

116) $e^{y+5} = 10$ 116) _____

A) -4 B) 7.303 C) 0.461 D) -2.697

Answer: D
Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

117) $\log_{10} 10$ 117) _____

A) 1 B) -1 C) 10 D) 0

Answer: A
Explanation: A)
B)
C)
D)

118) $\log_5 \sqrt[5]{\frac{1}{25}}$ 118) _____

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

Answer: C
Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

119) Let $\log_b A = 3$ and $\log_b B = -4$. Find $\log_b B^2$. 119) _____

A) 6 B) 16 C) -8 D) -16

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

120) The purchasing power of a dollar is decreasing at the rate of 8% annually, compounded continuously. How long will it take for the purchasing power of $1.00 to be worth $0.68? Round to the nearest hundredth. 120) _____

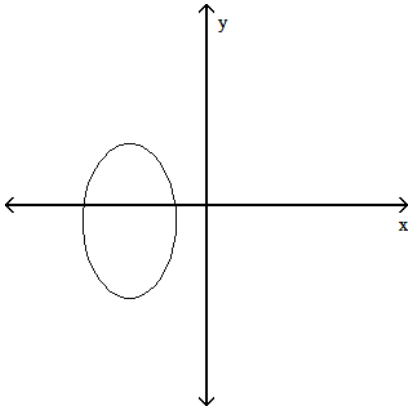
A) 8.50 yr B) 0.05 yr C) 0.48 yr D) 4.82 yr

Answer: D

Explanation: A)
B)
C)
D)

Decide whether the graph represents a function.

121) 121) _____



A) Function B) Not a function

Answer: B

Explanation: A)
B)

Write the logarithmic equation in exponential form.

122) $\log_4 16 = 2$ 122) _____

A) $16^2 = 4$ B) $2^4 = 16$ C) $4^2 = 16$ D) $4^{16} = 2$

Answer: C

Explanation: A)
B)
C)
D)

Solve the problem.

123) A farmer has 1000 yards of fencing to enclose a rectangular garden. Express the area A of the rectangle as a function of the width x of the rectangle. What is the domain of A? 123) _____

A) $A(x) = -x^2 + 500x;\ \{x|0 < x < 1000\}$ B) $A(x) = -x^2 + 500x;\ \{x|0 < x < 500\}$

C) $A(x) = -x^2 + 1000x;\ \{x|0 < x < 1000\}$ D) $A(x) = x^2 + 500x;\ \{x|0 < x < 500\}$

Answer: B

Explanation: A)
B)
C)
D)

Evaluate the function.

124) $f(x) = \frac{2x}{4x + 2}$; Find f(5). 124) _____

A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) 5 D) $\frac{5}{11}$

Answer: D
Explanation: A)
B)
C)
D)

Write the exponential equation in logarithmic form.

125) $\left(\frac{3}{7}\right)^{-2} = \frac{49}{9}$ 125) _____

A) $\log_{49/9}(-2) = \frac{3}{7}$ B) $\log_{3/7}\frac{49}{9} = -2$

C) $\log_{49/9}\frac{3}{7} = -2$ D) $\log_{3/7}(-2) = \frac{49}{9}$

Answer: B
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

126) $y = \frac{-3}{x + 7}$ 126) _____

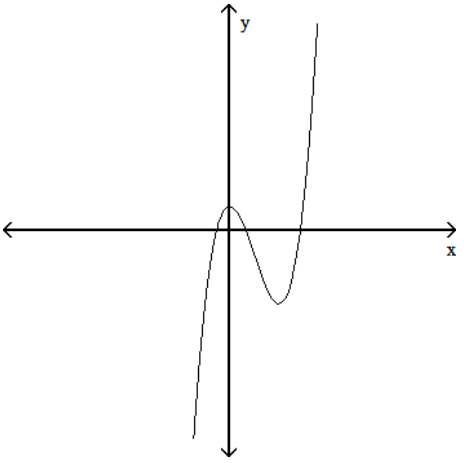
A) $\left\{-\frac{3}{8}, -\frac{1}{4}, -\frac{3}{5}, -\frac{3}{5}, -1\right\}$ B) $\left\{-\frac{3}{11}, -\frac{1}{2}, -\frac{3}{7}, -\frac{3}{8}, -\frac{1}{3}\right\}$

C) $\left\{-\frac{3}{5}, -\frac{1}{2}, -\frac{3}{7}, -\frac{3}{8}, -\frac{1}{3}\right\}$ D) $\left\{-\frac{3}{7}, -\frac{1}{2}, -\frac{3}{8}, -\frac{1}{3}, -1\right\}$

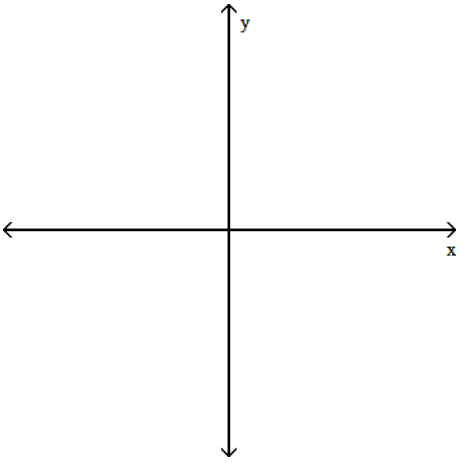
Answer: C
Explanation: A)
B)
C)
D)

Graph the indicated new function, given the graph for y = f(x).

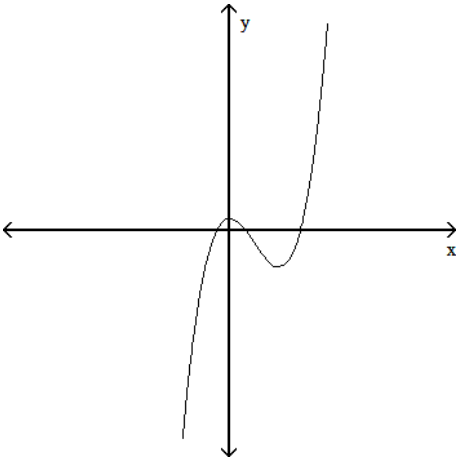
127) y = af(x), where a satisfies -1 < a < 0 127) _____



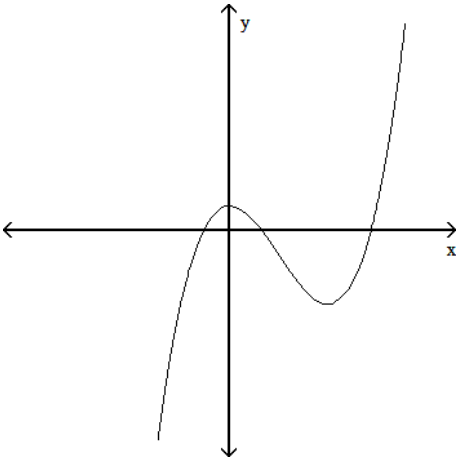
A)



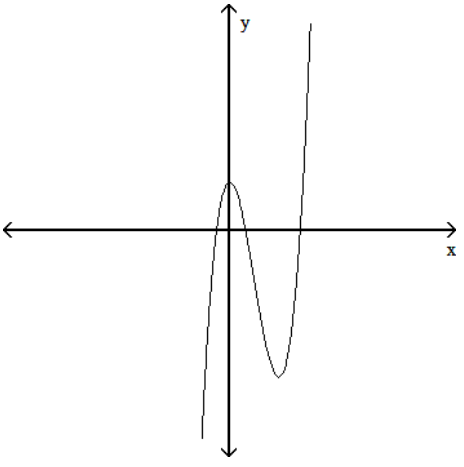
B)

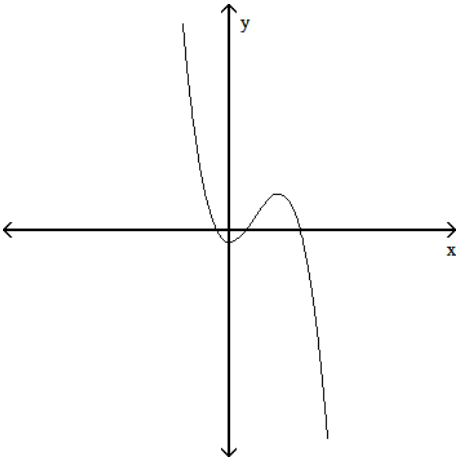


C)



D)





Answer: D

Explanation: A)

B)

C)

D)

Evaluate the function.

128) $f(x) = 5x^2 - 3x + 2$; Find $f(t - 1)$. 128) _____

A) $5t^2 - 13t + 4$ B) $5t^2 + 7t + 4$ C) $5t^2 - 13t + 10$ D) $-13t^2 + 5t + 10$

Answer: C

Explanation: A)
B)
C)
D)

Approximate the expression in the form a^x without using e. Round to the nearest thousandth when necessary.

129) e^{-5x} 129) _____

A) -13.591^x B) 0.544^x C) -1.609^x D) 0.007^x

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

130) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to double if its annual growth rate is 3.4%? Round to the nearest year. 130) _____

A) 1 yr B) 59 yr C) 9 yr D) 20 yr

Answer: D

Explanation: A)
B)
C)
D)

Find $\frac{f(x + h) - f(x)}{h}$.

131) $f(x) = \frac{6}{x^2}$ 131) _____

A) $-\frac{h}{x(x + h)}$ B) $-\frac{6}{(x + h)}$

C) $\frac{h}{x - h}$ D) $-\frac{12x + 6h}{x^2(x^2 + 2hx + h^2)}$

Answer: D

Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

132) $f(x) = -2x^3 + 4x$ 132) _____

A) Even B) Odd C) Neither

Answer: B

Explanation: A)
B)
C)

Solve the problem.

133) Suppose that the number of bacteria in a culture after x hours is given by $f(x) = 1000 \cdot 6^{0.25x}$. How many bacteria are in the culture after 6 hours? 133) _____

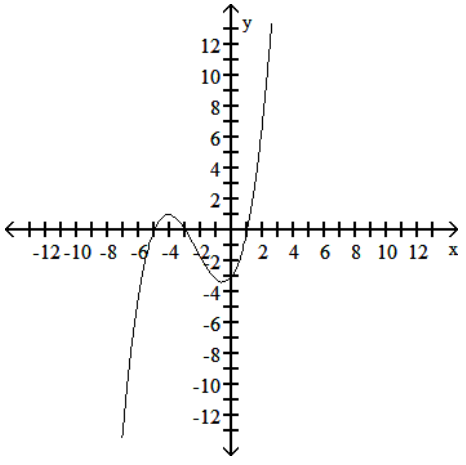
A) 3322 bacteria B) 9 bacteria C) 340 bacteria D) 14,697 bacteria

Answer: D

Explanation: A)
B)
C)
D)

Give the domain and range of the function.

134) 134) _____



A) Domain $(-\infty, \infty)$; Range $(-\infty, \infty)$ B) Domain $\{-5, -3, 1\}$; Range $(-\infty, \infty)$

C) Domain $(-\infty, \infty)$; Range $[-3, \infty)$ D) Domain $(-\infty, \infty)$; Range $\{-5, -3, 1\}$

Answer: A

Explanation: A)
B)
C)
D)

Evaluate the function for the given value.

135) $f(x) = \begin{cases} \frac{x - 5}{2x + 1} & \text{if } x \neq -\frac{1}{2} \\ 12 & \text{if } x = -\frac{1}{2} \end{cases}$; f(5) 135) _____

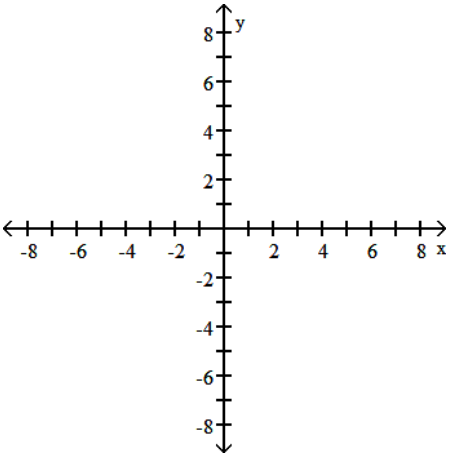
A) 0 B) $\frac{1}{11}$ C) 12 D) 60

Answer: A

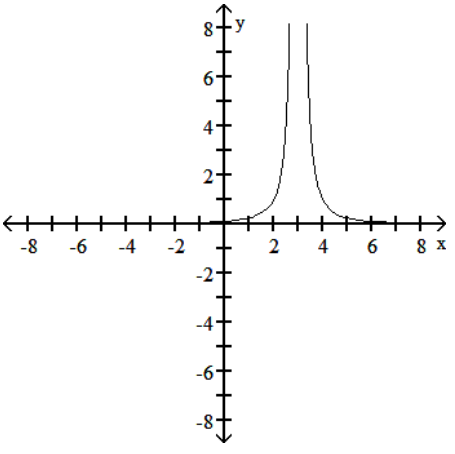
Explanation: A)
B)
C)
D)

Graph the rational function.

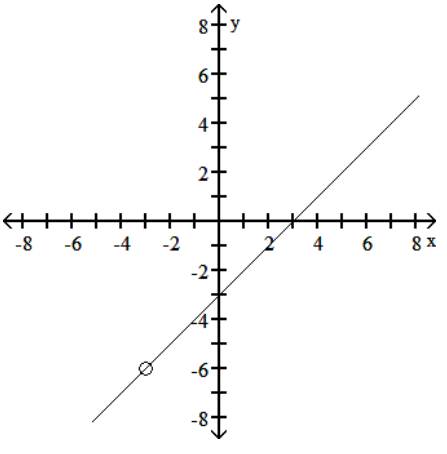
136) $f(x) = \frac{x^2 - 9}{x - 3}$ 136) _____



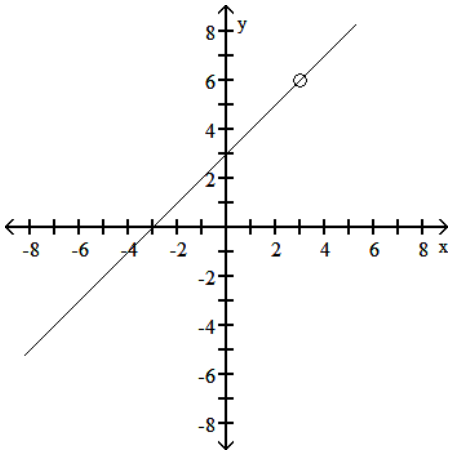
A)



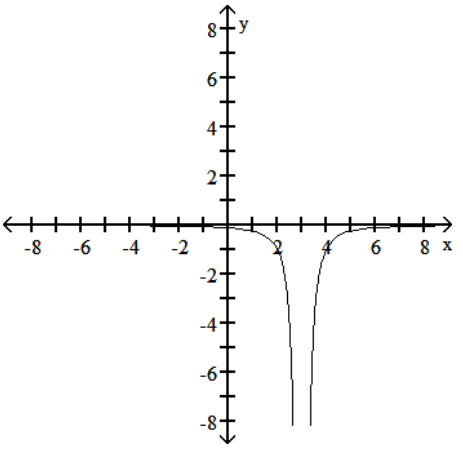
B)



C)



D)



Answer: C

Explanation: A)

B)

C)

D)

Evaluate the logarithm without using a calculator.

137) $\log_7 49$ 137) _____

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

Answer: B

Explanation: A)

B)

C)

D)

Solve the problem.

138) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. How long will it take for the population of a certain country to triple if its annual growth rate is 6.5%? Round to the nearest year. 138) _____

A) 17 yr B) 46 yr C) 1 yr D) 7 yr

Answer: A

Explanation: A)

B)

C)

D)

139) The number of acres in a landfill decreases according to the function $B = 7100e^{-0.05t}$, where t is measured in years. How many acres will the landfill have after 2 years? 139) _____

A) 5640 acres B) 16,348 acres C) 7100 acres D) 6424 acres

Answer: D

Explanation: A)

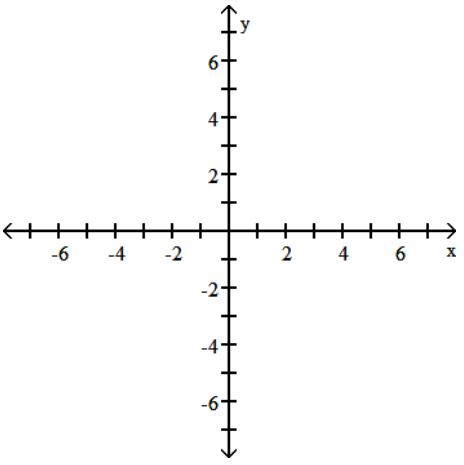
B)

C)

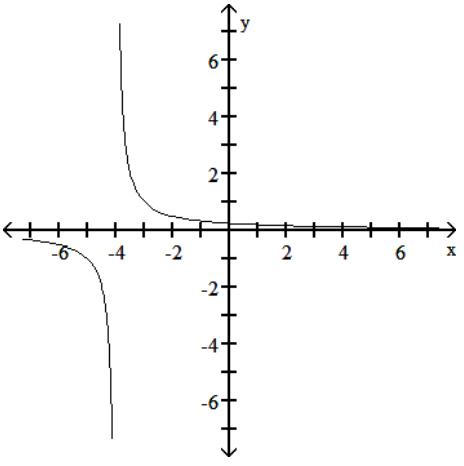
D)

Graph the rational function.

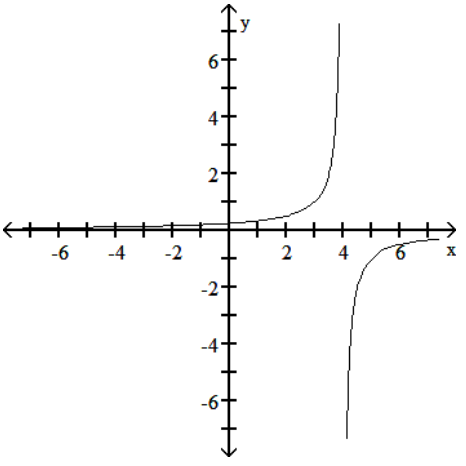
140) $y = \frac{-1}{x - 4}$ 140) _____



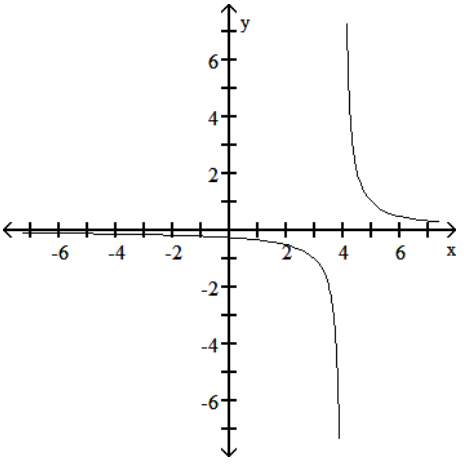
A)



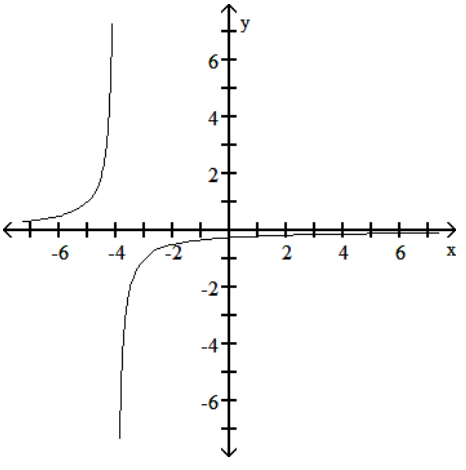
B)



C)



D)



Answer: B

Explanation: A)

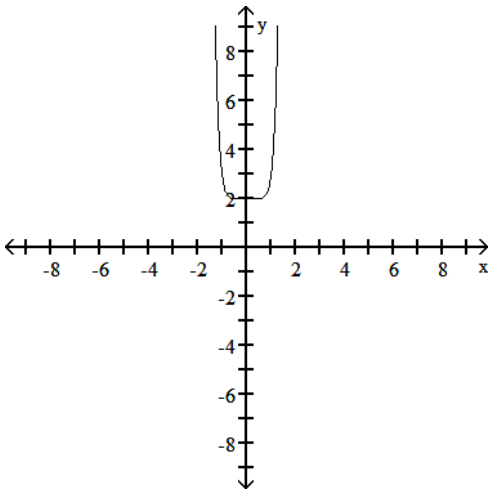
B)

C)

D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

141) 141) _____



A) Degree is even; +
B) Degree is odd; +
C) Degree is even; -
D) Can't identify degree; +

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

142) Find the effective rate corresponding to the nominal rate. 4% compounded quarterly. Round to the nearest hundredth. 142) _____

A) 4.10%
B) 4.06%
C) 4.01%
D) 4.13%

Answer: B
Explanation: A)
B)
C)
D)

143) In the formula $N = Ie^{kt}$, N is the number of items in terms of an initial population I at a given time t and k is a growth constant equal to the percent of growth per unit time. There are currently 67 million cars in a certain country, increasing by 1.4% annually. How many years will it take for this country to have 81 million cars? Round to the nearest year. 143) _____

A) 4 yr
B) 14 yr
C) 10 yr
D) 189 yr

Answer: B
Explanation: A)
B)
C)
D)

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

144) $\log_{7.8} 202$ 144) _____

A) 2.584 B) 25.897 C) 0.387 D) 2.305

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

145) The population of a small country increases according to the function $B = 1{,}900{,}000e^{0.02t}$, where t is measured in years. How many people will the country have after 6 years? 145) _____

A) 1,749,556 people B) 2,142,244 people

C) 2,504,688 people D) 4,028,501 people

Answer: B

Explanation: A)
B)
C)
D)

Give the domain of the function.

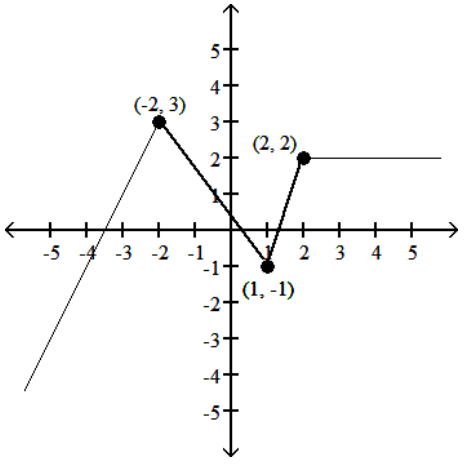
146) $f(x) = 3x + 1$ 146) _____

A) $(-\infty, \infty)$ B) $(-\infty, 0) \cup (0, \infty)$ C) $[-1, \infty)$ D) $(0, \infty)$

Answer: A

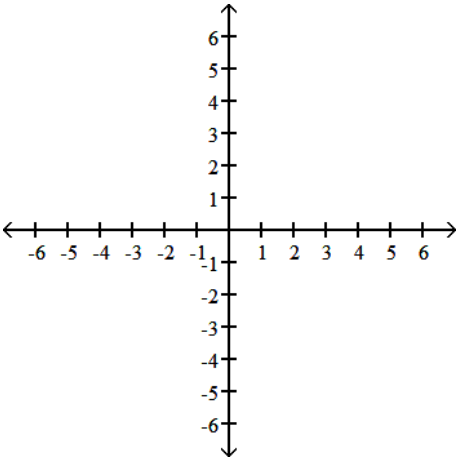
Explanation: A)
B)
C)
D)

Using the graph below, sketch the graph of the given function.

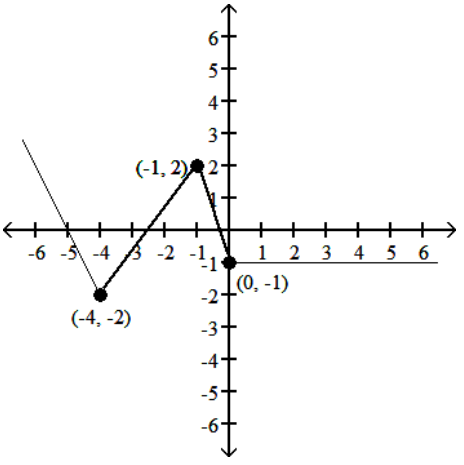


147) y = f(- x - 2) + 1

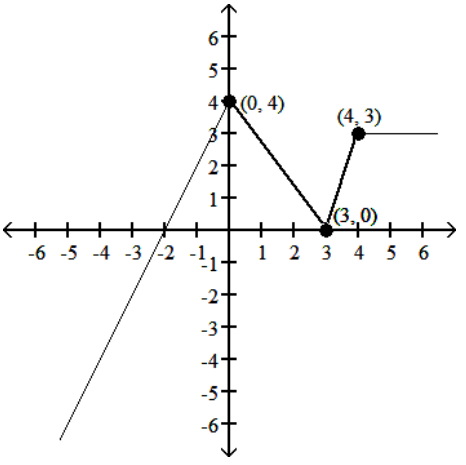
147) _____



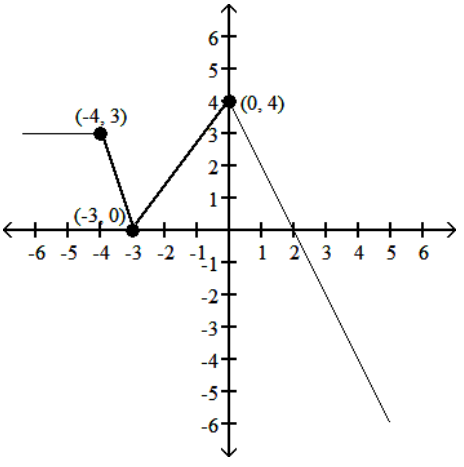
A)



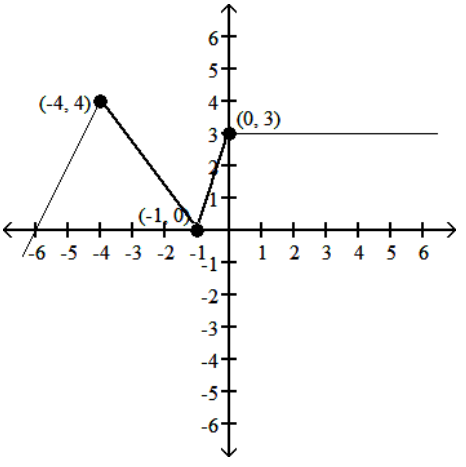
B)



C)



D)



Answer: C

Explanation: A)

B)

C)

D)

Solve the problem.

148) A college student invests $11,000 in an account paying 5% per year compounded annually. In how many years will the amount at least triple? Round to the nearest tenth when necessary. 148) _____

A) 30.8 yr B) 22.5 yr C) 25.7 yr D) 28.4 yr

Answer: B

Explanation: A)
B)
C)
D)

149) The polynomial function $G(x) = -0.006x^4 + 0.140x^3 - 0.53x^2 + 1.79x$ measures the concentration of a dye in the bloodstream x seconds after it is injected. Does the concentration increase between 11 and 12 seconds? 149) _____

A) Yes B) No

Answer: A

Explanation: A)
B)

Solve the equation.

150) $4^{(5 - 3x)} = \frac{1}{256}$ 150) _____

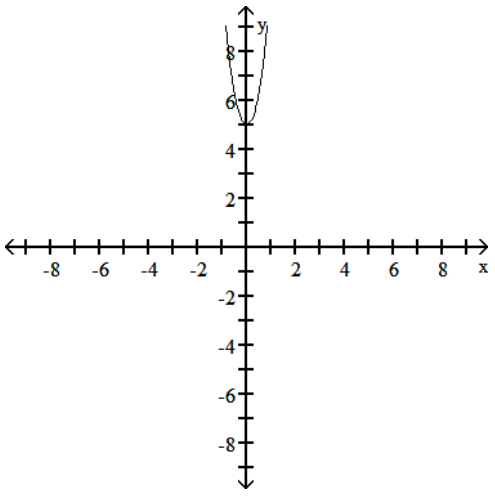
A) -3 B) 128 C) 3 D) $\frac{1}{64}$

Answer: C

Explanation: A)
B)
C)
D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

151) 151) _____



A) Degree is even; + B) Degree is even; -
C) Can't identify degree; + D) Degree is odd; +

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

152) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by 152) _____
$y = \frac{212{,}500}{x + 425}$. What is the cost per ton for x = 200?

A) $340.00 B) $100,000.00 C) $637.50 D) $68,000.00

Answer: A
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

153) $y = x^2$ 153) _____

A) {0, 1, 2} B) {0, 1, 4} C) {-4, -1, 0, 1, 4} D) {-2, -1, 0, 1, 2}

Answer: B
Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

154) $y = \frac{5}{x - 8}$ 154) _____

A) Vertical asymptote at x = -8; horizontal asymptote at y = 0
B) Vertical asymptote at x = 8; horizontal asymptote at y = 5
C) Vertical asymptote at x = -8; no horizontal asymptote
D) Vertical asymptote at x = 8; horizontal asymptote at y = 0

Answer: D
Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

155) $\log_5 \frac{3p}{5k}$ 155) _____

A) $\frac{\log_5 3 + \log_5 p}{1 + \log_5 k}$

B) $\log_5 3p - \log_5 5k$

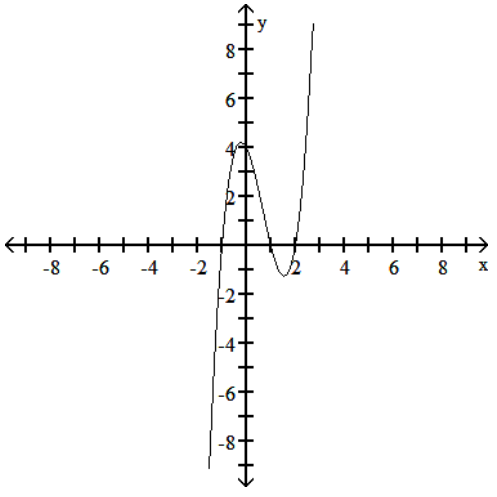
C) $\frac{\log_5 3 \log_5 p}{\log_5 k}$

D) $\log_5 3 + \log_5 p - 1 - \log_5 k$

Answer: D
Explanation: A)
B)
C)
D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

156) 156) _____



A) Degree is odd; +
B) Can't identify degree; +
C) Degree is even; -
D) Degree is even; +

Answer: A
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

157) $y = \frac{x}{x+3}$ 157) _____

A) $\left\{-1, \frac{1}{2}, 0, \frac{3}{4}, \frac{7}{5}\right\}$

B) $\left\{-2, -\frac{1}{2}, 0, \frac{1}{4}, \frac{2}{5}\right\}$

C) $\left\{-2, \frac{1}{2}, 0, \frac{1}{4}, \frac{2}{5}\right\}$

D) $\left\{-1, -\frac{1}{2}, 0, \frac{3}{4}, \frac{7}{5}\right\}$

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

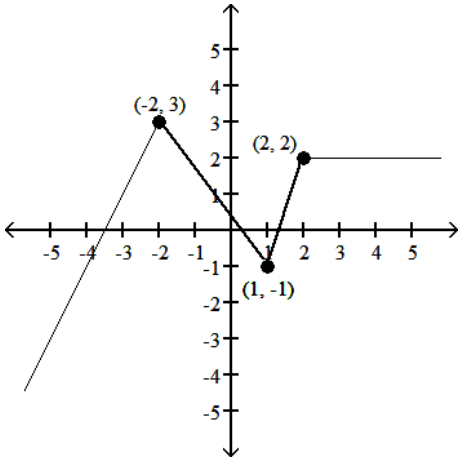
158) Suppose a life insurance policy costs $32 for the first unit of coverage and then $8 for each additional unit of coverage. Let C(x) be the cost for insurance of x units of coverage. What will 10 units of coverage cost? 158) _____

A) $80 B) $48 C) $112 D) $104

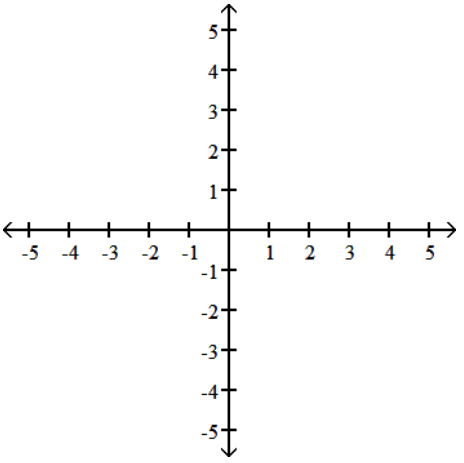
Answer: D

Explanation: A)
B)
C)
D)

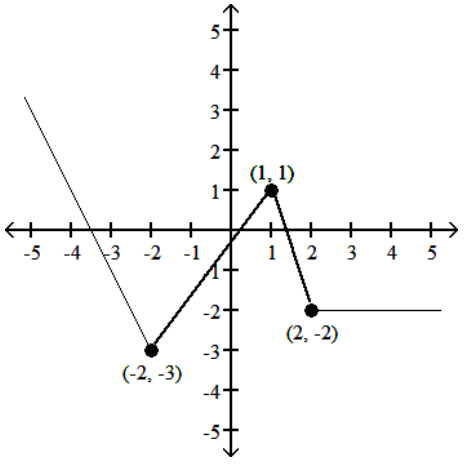
Using the graph below, sketch the graph of the given function.



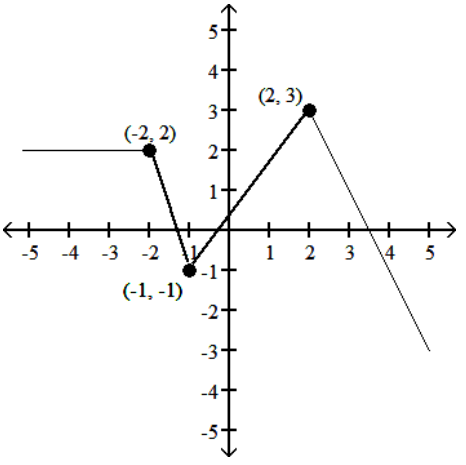
159) y = f(-x) 159) _____



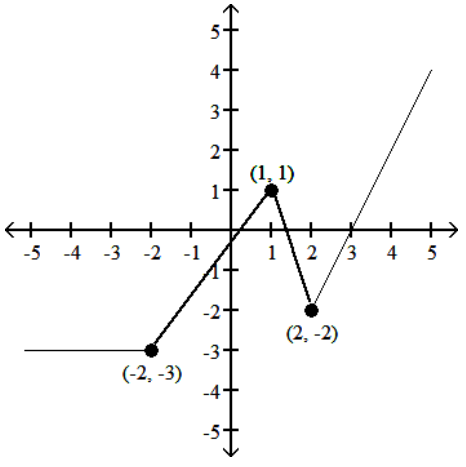
A)



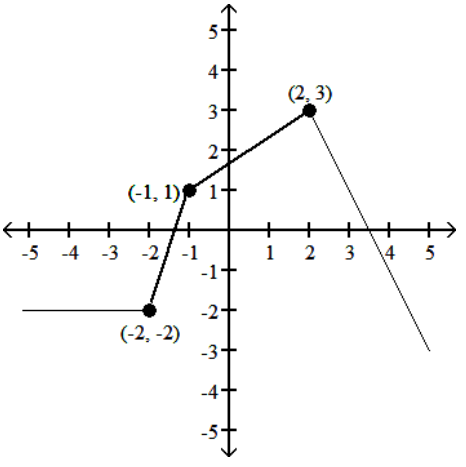
B)



C)



D)



Answer: B

Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

160) ln l 160) _____

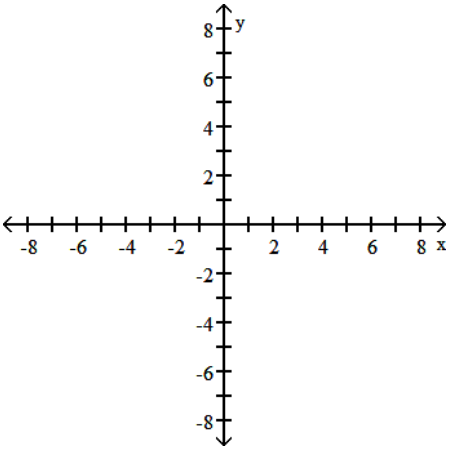
A) 1 B) e C) -1 D) 0

Answer: D

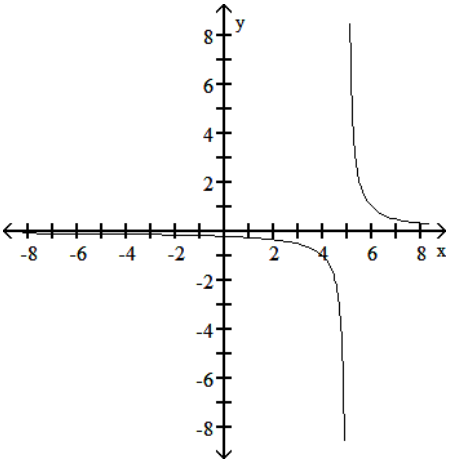
Explanation: A)
B)
C)
D)

Graph the rational function.

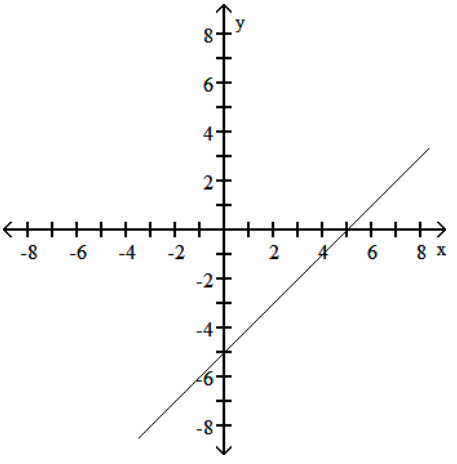
161) $y = \frac{x^2 + 10x + 25}{x + 5}$ 161) _____



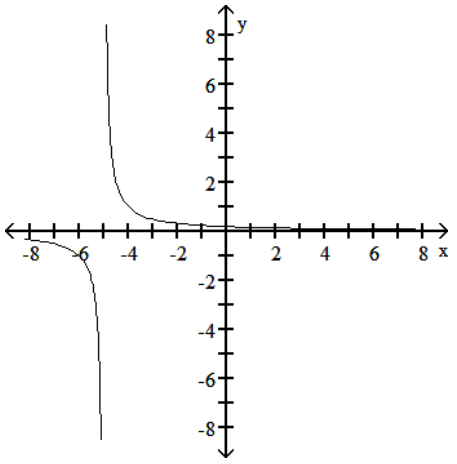
A)



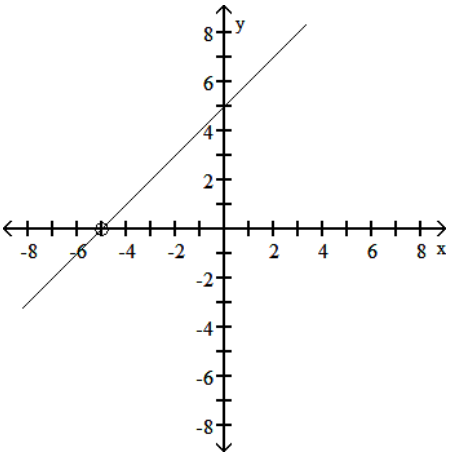
B)



C)



D)



Answer: D
Explanation: A)
B)
C)
D)

Evaluate the function.

162) $f(x) = (x - 5)(x + 2)$; Find $f(-1)$. 162) _____

A) 18 B) -12 C) 4 D) -6

Answer: D
Explanation: A)
B)
C)
D)

Write the exponential equation in logarithmic form.

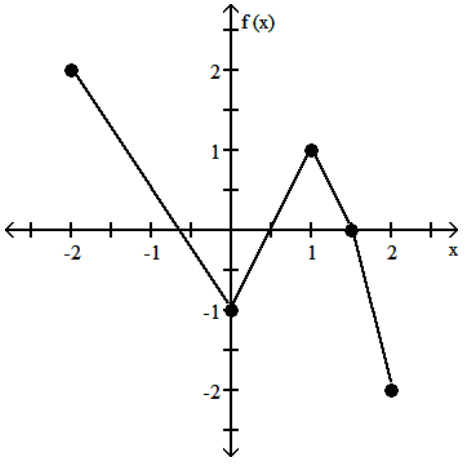
163) $2^{-3} = \frac{1}{8}$ 163) _____

A) $\log_{-3} \frac{1}{8} = 2$ B) $\log_2 -3 = \frac{1}{8}$ C) $\log_2 \frac{1}{8} = -3$ D) $\log_{1/8} 2 = -3$

Answer: C
Explanation: A)
B)
C)
D)

Use the graph to evaluate the function f(x) at the indicated value of x.

164) Find f(1.5). 164) _____



A) 1 B) -2
C) 0 D) None of these are correct.

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

165) Find the amount of interest earned on the following deposit: $1000 at 6% compounded annually for 6 years 165) _____

A) $503.63 B) $338.23 C) $1418.52 D) $418.52

Answer: D
Explanation: A)
B)
C)
D)

166) The magnitude of an earthquake, measured on the Richter scale, is given by $R(I) = \log\frac{I}{I_0}$, where I is the amplitude registered on a seismograph located 100 km from the epicenter of the earthquake, and I_0 is the amplitude of a certain small size earthquake. Find the Richter scale rating of an earthquake with an amplitude of 31,623 I_0. 166) _____

A) 0.45 B) 3.5 C) 4.5 D) 10.4

Answer: C
Explanation: A)
B)
C)
D)

167) An investment of $13,335 earns 4% interest compounded monthly for 2 years. (a) What is the value of the investment after 2 years? (b) If money can be deposited at 8% compounded quarterly, find the present value of the investment. Round to the nearest cent. 167) _____

A) (a) $15,443.71 (b) $14,082.11
B) (a) $14,395.73 (b) $13,082.11
C) (a) $13,694.78 (b) $12,574.12
D) (a) $14,443.71 (b) $12,327.57

Answer: D
Explanation: A)
B)
C)
D)

Write the exponential equation in logarithmic form.

168) $4^2 = 16$ 168) _____

A) $\log_{16} 4 = 2$
B) $\log_2 16 = 4$
C) $\log_4 2 = 16$
D) $\log_4 16 = 2$

Answer: D
Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

169) Let $\log_b 2 = a$ and $\log_b 3 = c$. Find $\log_b \left(8b^3\right)$. 169) _____

A) 3ab
B) 3b + a - 3
C) 3a + 3
D) 3(a + b)

Answer: C
Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

170) $f(x) = -5x^4 - x^2$ 170) _____

A) Even
B) Odd
C) Neither

Answer: A
Explanation: A)
B)
C)

Solve the problem.

171) Kimberly invested $3000 in her savings account for 6 years. When she withdrew it, she had $4511.42. Interest was compounded continuously. What was the interest rate on the account? Round to the nearest tenth of a percent when necessary. 171) _____

A) 6.8%
B) 6.95%
C) 6.9%
D) 6.7%

Answer: A
Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

172) $y = \frac{x^2 - 16}{x - 4}$ 172) _____

A) No asymptotes; hole at x = 4
B) Vertical asymptote at x = 4; no horizontal asymptote
C) Vertical asymptote at x = -4; no horizontal asymptote
D) No vertical asymptote; horizontal asymptote at y = 4

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

173) The polynomial function $I(t) = -0.1t^2 + 1.7t$ represents the yearly income (or loss) from a real estate investment, where t is time in years. After what year does income begin to decline? 173) _____

A) 17 B) 8.5 C) 7.5 D) 11.33

Answer: B
Explanation: A)
B)
C)
D)

Give the domain of the function.

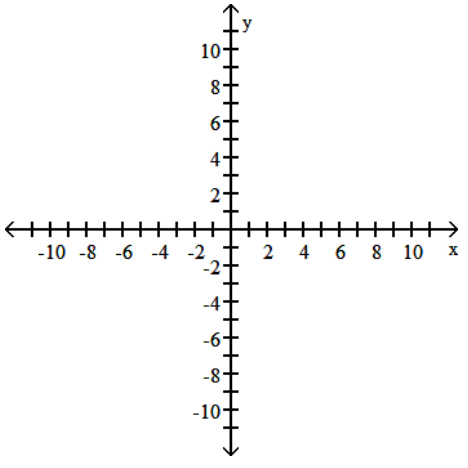
174) $f(x) = \sqrt{\frac{x + 1}{x - 8}}$ 174) _____

A) $(-\infty, -1) \cup (8, \infty)$ B) $(-1, 8)$ C) $(-\infty, -1] \cup [8, \infty)$ D) $(-\infty, -1] \cup (8, \infty)$

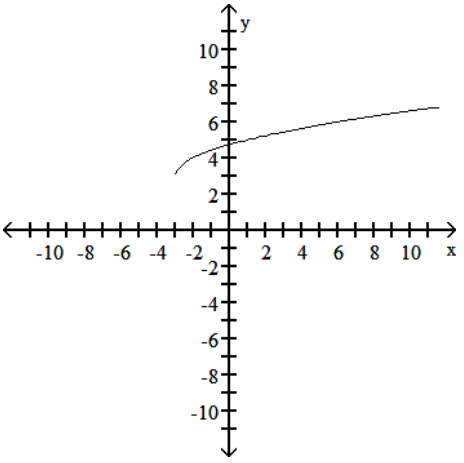
Answer: D
Explanation: A)
B)
C)
D)

Graph the function.

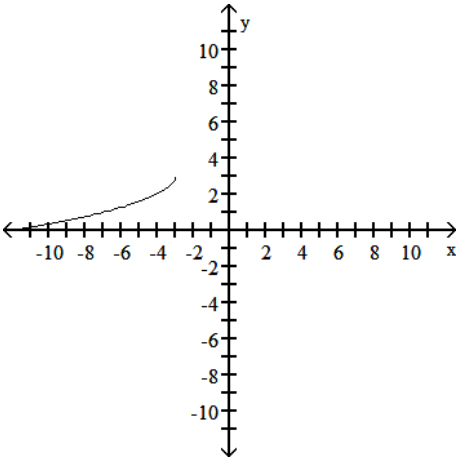
175) $f(x) = -\sqrt{-3 - x} + 3$ 175) _____



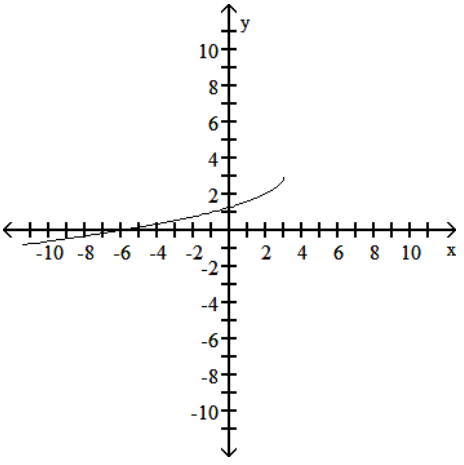
A)



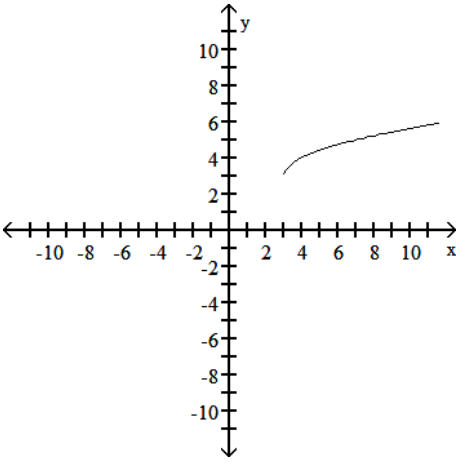
B)



C)



D)



Answer: B
Explanation: A)
B)
C)
D)

Solve the problem.

176) How long will it take for prices in the economy to double at a 6% annual inflation rate? Round to the nearest hundredth when necessary. 176) _____

A) 10.24 yr B) 11.9 yr C) 23.45 yr D) 18.85 yr

Answer: B
Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

177) $\ln e^4 = 4$ 177) _____

A) $\ln 4 = 4$ B) $e^4 = e^4$ C) $\ln e^4 = e^4$ D) $e^4 = 4$

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

178) Suppose the consumption of electricity grows at 4% per year, compounded continuously. Find the number of years before the use of electricity has tripled. Round to the nearest hundredth. 178) _____

A) 75.00 yr B) 0.27 yr C) 27.47 yr D) 2.75 yr

Answer: C

Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

179) $\log_6 7x$ 179) _____

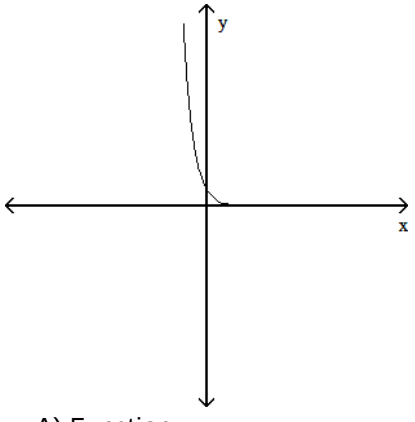
A) $\log_3 7 - \log_3 x$ B) $\log_6 7 + \log_6 x$ C) $\log_3 7 + \log_3 x$ D) $\log_6 7 - \log_6 x$

Answer: B

Explanation: A)
B)
C)
D)

Decide whether the graph represents a function.

180) 180) _____



A) Function B) Not a function

Answer: A

Explanation: A)
B)

Solve the equation. Round decimal answers to the nearest thousandth.

181) $2e^{3x + 6} = 6$ 181) _____

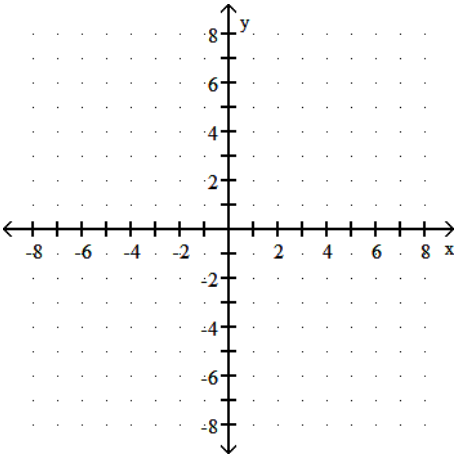
A) 2.366 B) -1.701 C) -1.634 D) 0.000

Answer: C

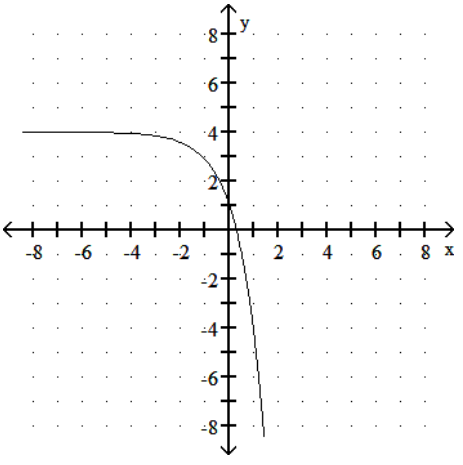
Explanation: A)
B)
C)
D)

Graph the function.

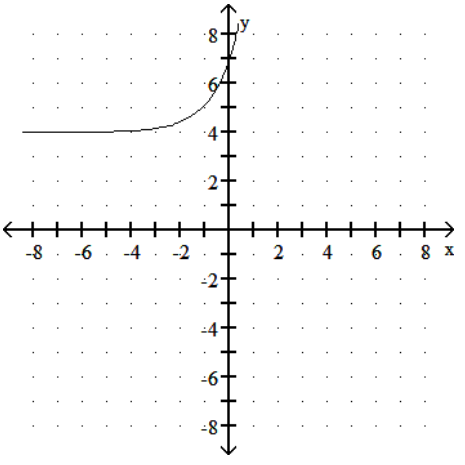
182) $y = -3e^{x} + 4$ 182) _____



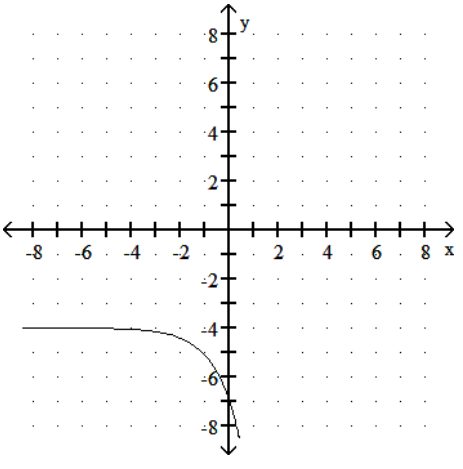
A)



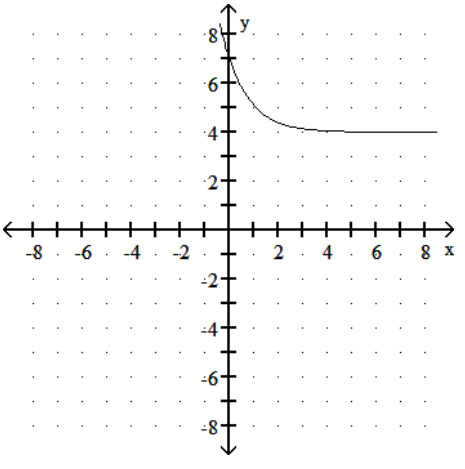
B)



C)



D)



Answer: A
Explanation: A)
B)
C)
D)

Solve the equation.

183) $\log_7 (7x - 1) = \log_7 (4x + 7)$ 183) _____

A) 6 B) $\frac{8}{3}$ C) 2 D) No solution

Answer: B
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

184) $y = 2x - 1$ 184) _____

A) {-4, -3, -2, -1, 0} B) {-5, -3, -1, 1, 3}
C) {-2, -1, 0, 1, 2} D) {-3, -1, 1, 3, 5}

Answer: B
Explanation: A)
B)
C)
D)

Solve the problem.

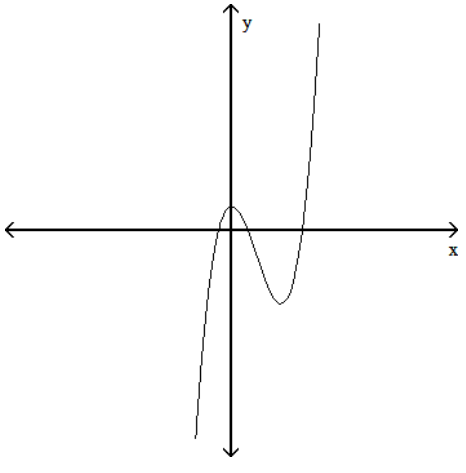
185) Let $C(x) = 11x + 7$ be the cost to produce x units of a product, and let $R(x) = - x^2 + 19x$ be the revenue. Find the maximum profit. 185) _____

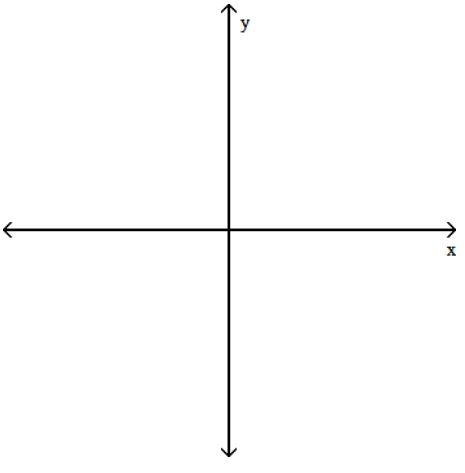
A) $12 B) $7 C) $4 D) $9

Answer: D
Explanation: A)
B)
C)
D)

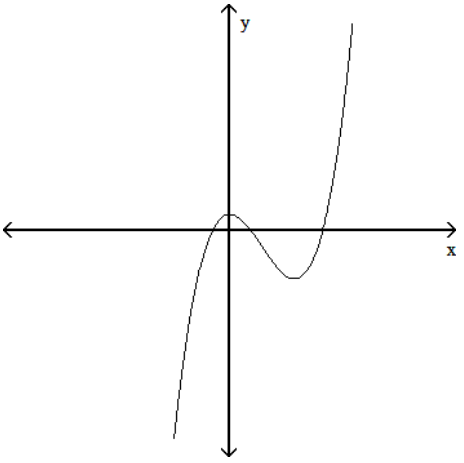
Graph the indicated new function, given the graph for y = f(x).

186) y = f(ax), where a satisfies 1 < a 186) _____

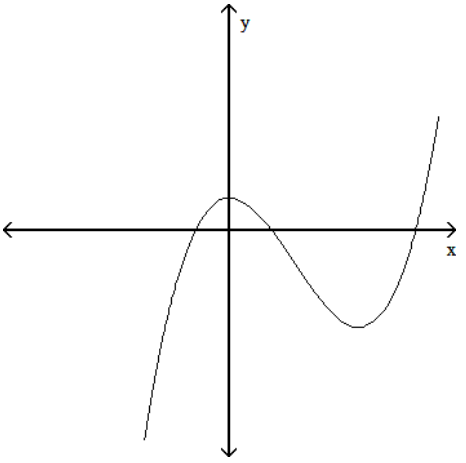




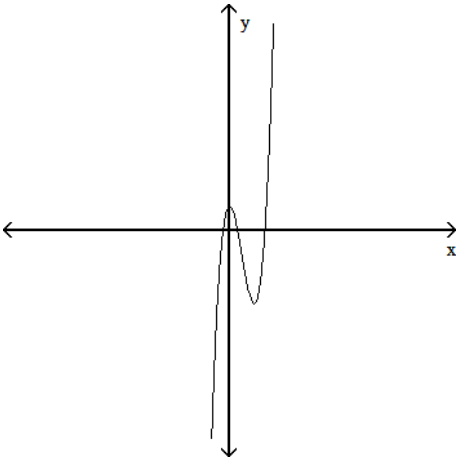
A)



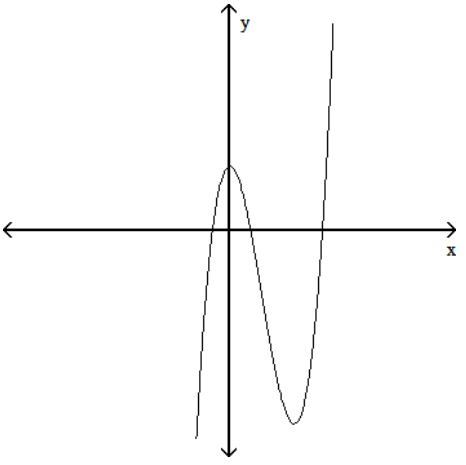
B)



C)



D)



Answer: C

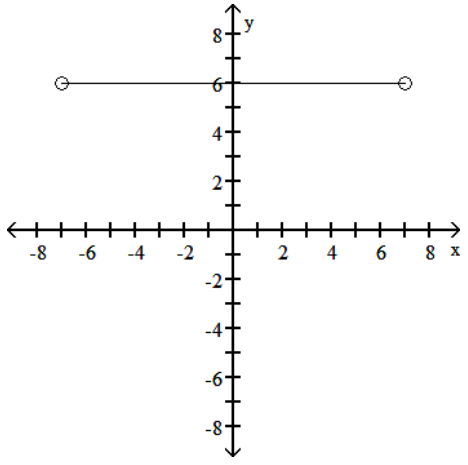
Explanation: A)

B)

C)

D)

Give the domain and range of the function.

187) 

187) _____

A) Domain {6} ; Range (-7, 7)
B) Domain $(-\infty, \infty)$; Range {6}
C) Domain (-7, 7) ; Range {6}
D) Domain [-7, 7] ; Range {6}

Answer: C
Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

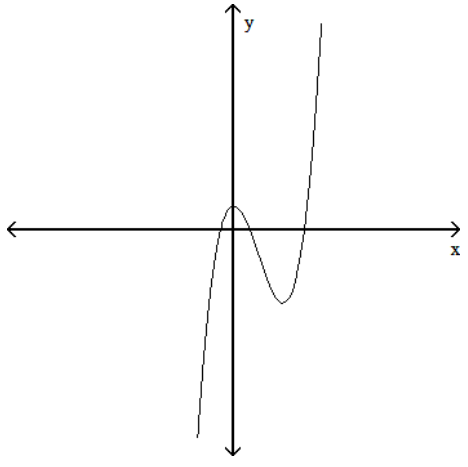
188) $f(x) = |x^2 + x|$ 188) _____

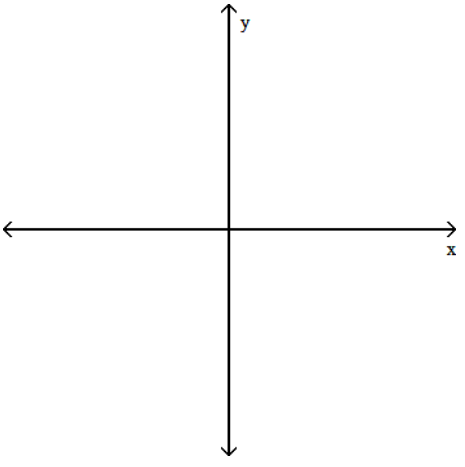
A) Even B) Odd C) Neither

Answer: C
Explanation: A)
B)
C)

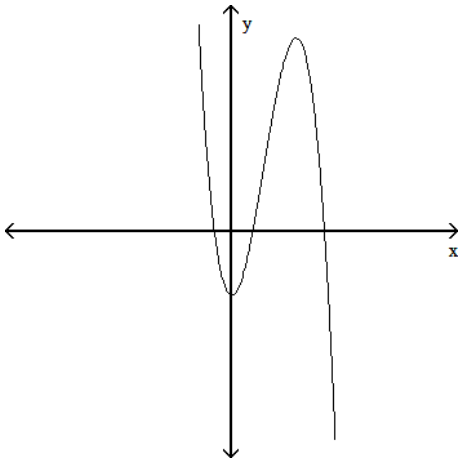
Graph the indicated new function, given the graph for y = f(x).

189) y = f(ax), where a satisfies -1 < a < 0 189) _____

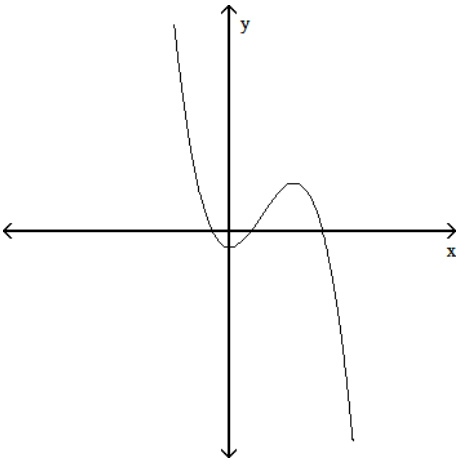




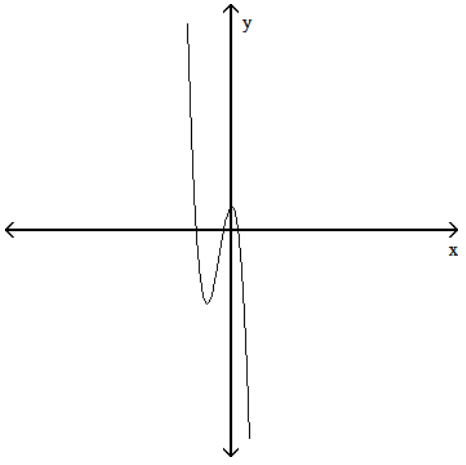
A)



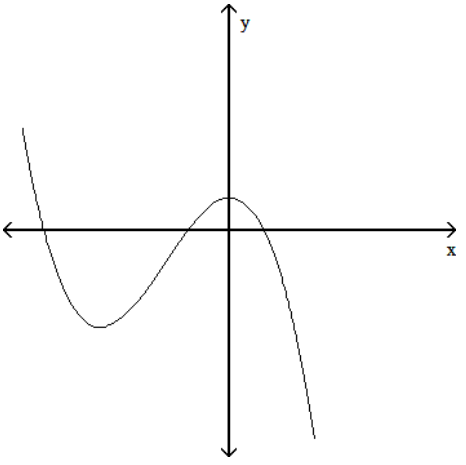
B)



C)



D)



Answer: D

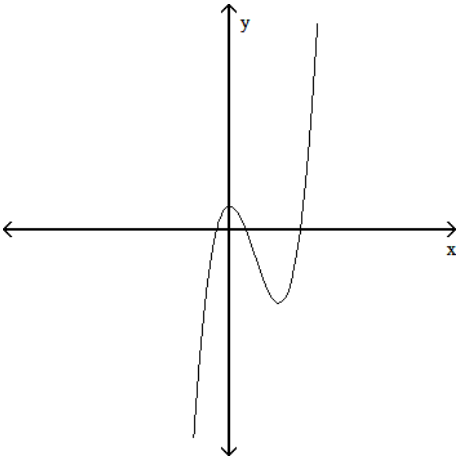
Explanation: A)

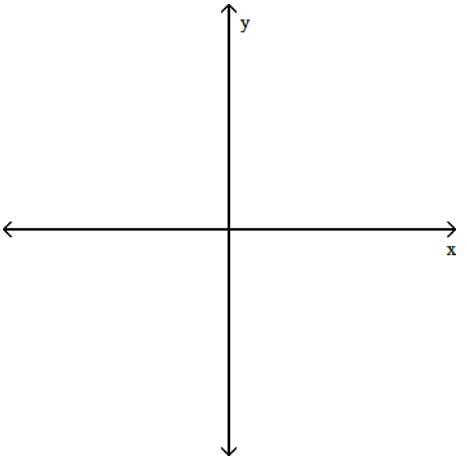
B)

C)

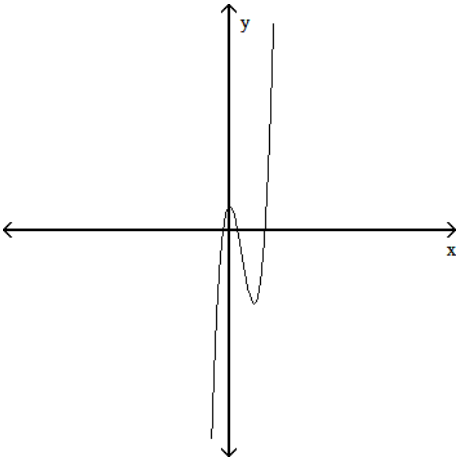
D)

190) y = f(ax), where a satisfies 0 < a < 1 190) _____

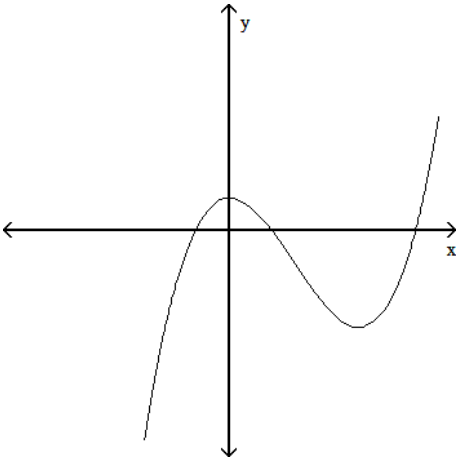




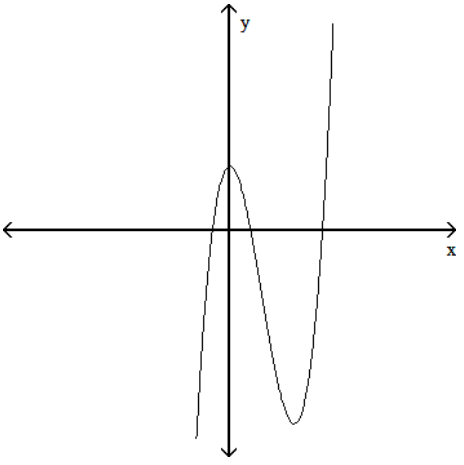
A)



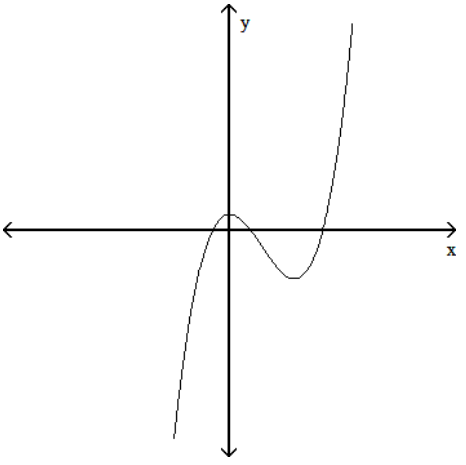
B)



C)



D)



Answer: B

Explanation: A)
B)
C)
D)

Find the domain of the function.

191) $f(x) = \log_4 (49 - x^2)$ 191) _____

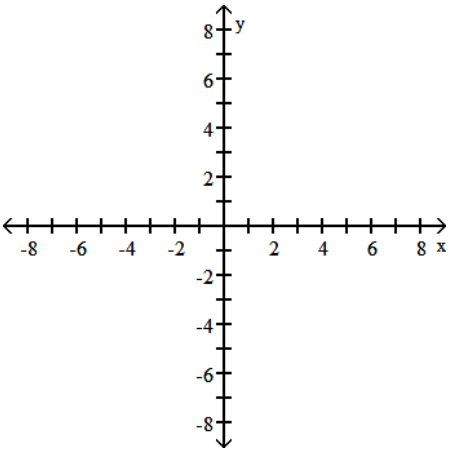
A) $-7 < x < 7$ B) $-49 < x < 49$ C) $x < -7$ and $x > 7$ D) $-7 \leq x \leq 7$

Answer: A

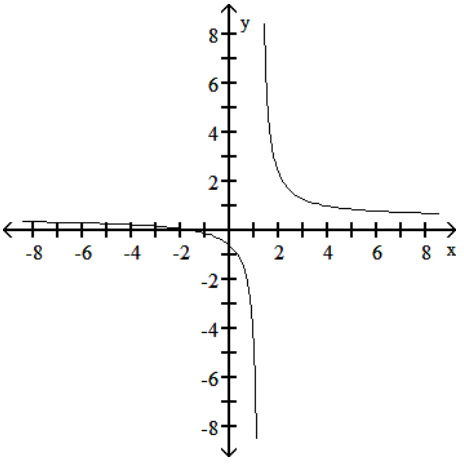
Explanation: A)
B)
C)
D)

Graph the rational function.

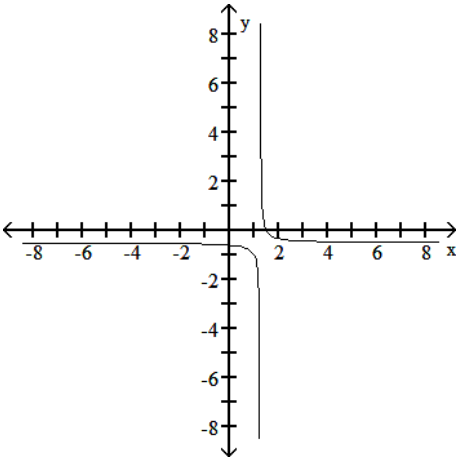
192) $y = \frac{-3 - 2x}{4x + 5}$ 192) _____



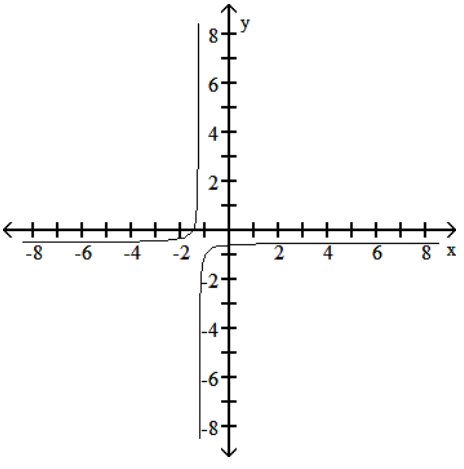
A)



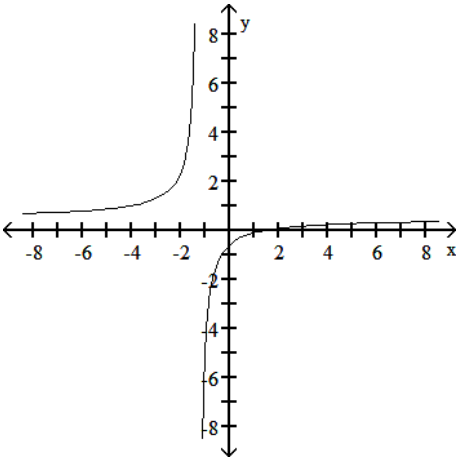
B)



C)



D)



Answer: C

Explanation: A)

B)

C)

D)

Solve the problem.

193) The pH of a solution is defined as $pH = -\log[H^+]$, where $[H^+]$ is the concentration of hydrogen ions in the solution. The pH of pure water is 7, while the pH of lemon juice is about 2. How much greater is the concentration of hydrogen ions in lemon juice than in pure water? 193) _____

A) 10 times greater
B) 10,000 times greater
C) 5 times greater
D) 100,000 times greater

Answer: D
Explanation: A)
B)
C)
D)

Solve the equation.

194) $\frac{1}{2}\log_2 x^2 = \log_4 4x$ 194) _____

A) 4, 0 B) 4 C) 8 D) No solution

Answer: B
Explanation: A)
B)
C)
D)

Solve the problem.

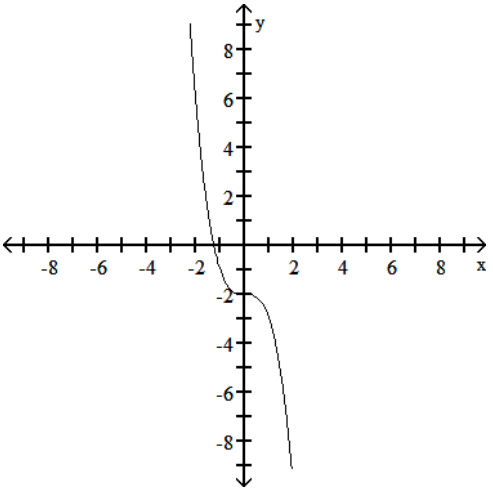
195) In the following formula, y is the minimum number of hours of studying required to attain a test score of x: $y = \frac{0.47x}{100.5 - x}$. How many hours of study are needed to score 87? 195) _____

A) 6.03 hr B) 30.30 hr C) 100.95 hr D) 3.03 hr

Answer: D
Explanation: A)
B)
C)
D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

196) 196) _____



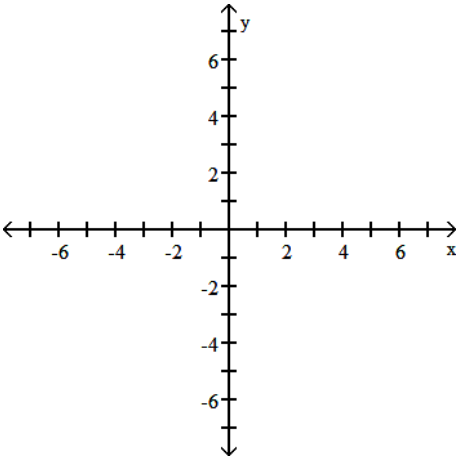
A) Degree is even; -
B) Degree is even; +
C) Can't identify degree; +
D) Degree is odd; -

Answer: D

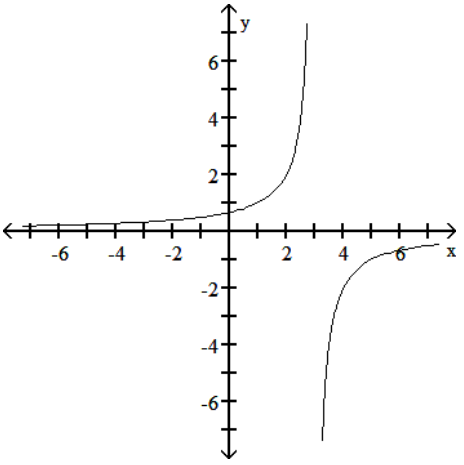
Explanation: A)
B)
C)
D)

Graph the rational function.

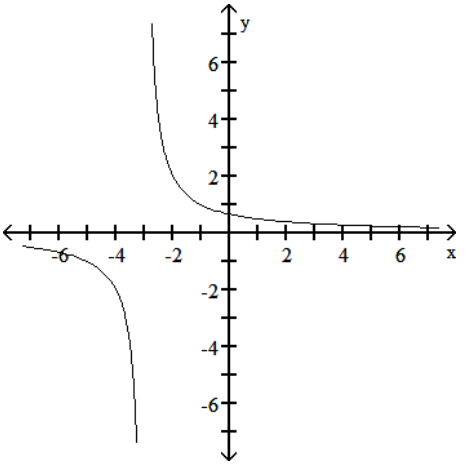
197) $y = \frac{4}{6 - 2x}$ 197) _____



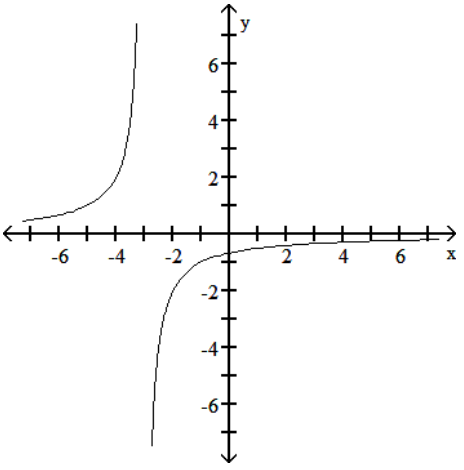
A)



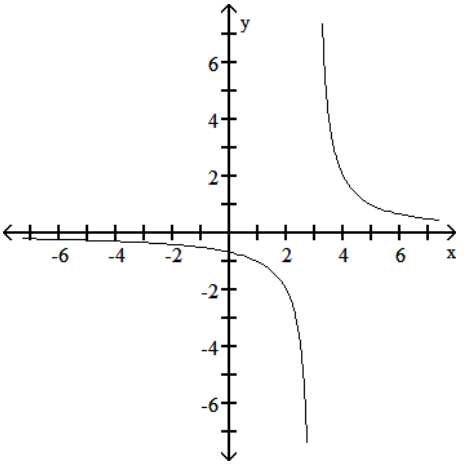
B)



C)



D)



Answer: A

Explanation: A)

B)

C)

D)

Classify the function as even, odd, or neither.

198) f(x) = 4x 198) _____

A) Even B) Odd C) Neither

Answer: B

Explanation: A)

B)

C)

Evaluate the function for the given value.

199) $f(x) = \begin{cases} \frac{x - 8}{2x + 1} & \text{if } x \neq -\frac{1}{2} \\ 12 & \text{if } x = -\frac{1}{2} \end{cases}$; $f\left(-\frac{1}{2}\right)$ 199) _____

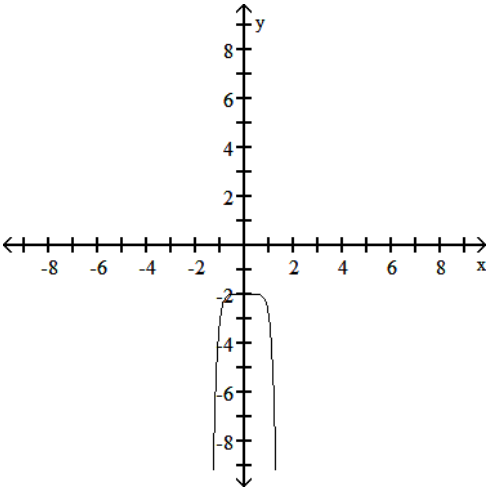
A) 0 B) 12 C) - 6 D) $-\frac{17}{2}$

Answer: B

Explanation: A)
B)
C)
D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

200) 200) _____



A) Degree is even; - B) Degree is even; +
C) Degree is odd; - D) Can't identify degree; -

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

201) The population of a particular city is increasing at a rate proportional to its size. It follows the function $P(t) = 1 + ke^{0.1t}$ where k is a constant and t is the time in years. If the current population is 49,000, in how many years is the population expected to be 122,500? 201) _____

A) 5 yr B) 4 yr C) 9 yr D) 70 yr

Answer: C

Explanation: A)
B)
C)
D)

Evaluate the function.

202) $f(x) = 4x^2 - 5x + 6$; Find f(2). 202) _____

A) 12 B) 0 C) 32 D) 0

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

203) Find the present value of the deposit. $2000 at 6% compounded monthly for 5 years. Round to the nearest cent. 203) _____

A) $2667.70 B) $1482.74 C) $1512.74 D) $2697.70

Answer: B

Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

204) Let $\log_b A = 3$ and $\log_b B = -5$. Find $\log_b AB$. 204) _____

A) -2 B) -15 C) 15 D) 8

Answer: A

Explanation: A)
B)
C)
D)

Approximate the expression in the form a^x without using e. Round to the nearest thousandth when necessary.

205) e^{4x} 205) _____

A) 10.873^x B) 43.308^x C) 54.598^x D) 1.386^x

Answer: C

Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

206) $f(x) = \frac{1}{x^2}$ 206) _____

A) Even B) Odd C) Neither

Answer: A

Explanation: A)
B)
C)

207) $f(x) = -7x^2 - 4$ 207) _____

A) Even B) Odd C) Neither

Answer: A

Explanation: A)
B)
C)

Solve the problem.

208) Suppose that the number of bacteria in a culture after x hours is given by $f(x) = 500 \cdot 6^{0.167x}$. How many bacteria are in the culture after 8 hours? 208) _____

A) 2,250,000 bacteria B) 5477 bacteria
C) 18,000 bacteria D) 3 bacteria

Answer: B

Explanation: A)
B)
C)
D)

Find $\frac{f(x + h) - f(x)}{h}$.

209) $f(x) = \frac{4}{x + 21}$ 209) _____

A) $\frac{-4}{(x + 4)^2}$ B) $\frac{4}{(x + h + 21)(x + 21)}$

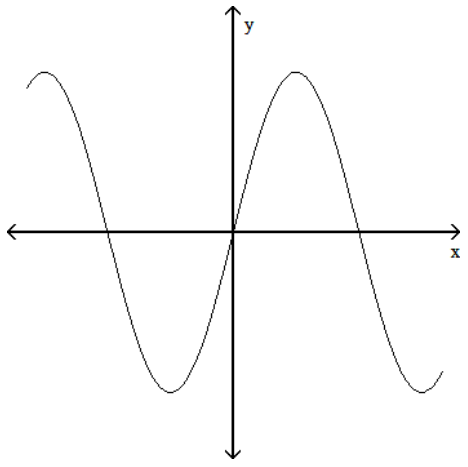
C) $\frac{-84}{(x + h + 21)(x + 21)}$ D) $\frac{-4}{(x + h + 21)(x + 21)}$

Answer: D

Explanation: A)
B)
C)
D)

Decide whether the graph represents a function.

210) 210) _____



A) Function B) Not a function

Answer: A

Explanation: A)

B)

Solve the problem.

211) A Community College wants to construct a rectangular parking lot on land bordered on one side by a highway. It has 840 feet of fencing to use along the other three sides. What should be the dimensions of the lot if the enclosed area is to be a maximum? (Hint: Let x represent the width of the lot, and let 840 - 2x represent the length.) 211) _____

A) 210 ft by 630 ft B) 210 ft by 420 ft C) 280 ft by 280 ft D) 280 ft by 560 ft

Answer: B

Explanation: A)

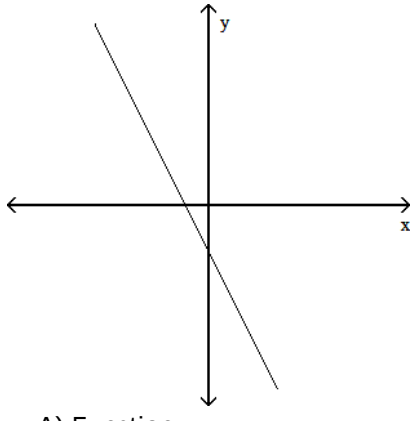
B)

C)

D)

Decide whether the graph represents a function.

212) 212) _____



A) Function B) Not a function

Answer: A

Explanation: A)

B)

Evaluate the logarithm without using a calculator.

213) $\log_7 \frac{1}{343}$ 213) _____

A) -49 B) 3 C) -3 D) 49

Answer: C

Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

214) 5x - y = 2 214) _____

A) {-10, 0, 10} B) {-12, 0, 12}

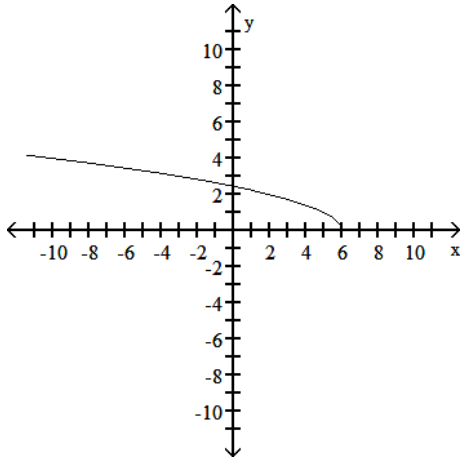
C) {-12, -7, -2, 3, 8} D) {-10, -5, 0, 5, 10}

Answer: C

Explanation: A)
B)
C)
D)

Give the domain and range of the function.

215) 215) _____



A) Domain $[0, \infty)$; Range $(-\infty, 6]$

B) Domain $(-\infty, 6]$; Range $[0, \infty)$

C) Domain $(-\infty, 6) \cup (6, \infty)$; Range $(-\infty, 0) \cup (0, \infty)$

D) Domain $(-\infty, \infty)$; Range $[0, \infty)$

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

216) The sales of a new model of notebook computer are approximated by: $S(x) = 6000 - 12{,}000e^{-x/10}$, where x represents the number of months the computer has been on the market and S represents sales in thousands of dollars. In how many months will the sales reach $1,500,000? Round to the nearest month. 216) _____

A) 13 months B) 17 months C) 20 months D) 10 months

Answer: D

Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

217) $\log_6 \frac{\sqrt{6}}{13}$ 217) _____

A) $\left(\frac{1}{2}\right) \log_6 6 - \log_6 13$ B) $\log_6 13 - \left(\frac{1}{2}\right) \log_6 6$

C) $\left(\frac{1}{2}\right) \log_3 6 - \log_3 13$ D) $\left(\frac{1}{2}\right) \log_6 6 + \log_6 13$

Answer: A

Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

218) $\ln \frac{1}{e^6} = -6$ 218) _____

A) $\left(\frac{1}{e^6}\right)^{-6} = e$ B) $-6^e = \frac{1}{e^6}$ C) $\left(\frac{1}{e^6}\right)^e = -6$ D) $e^{-6} = \frac{1}{e^6}$

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

219) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 10x + 32$, where x is the number of hotdogs. What is the most he can earn? 219) _____

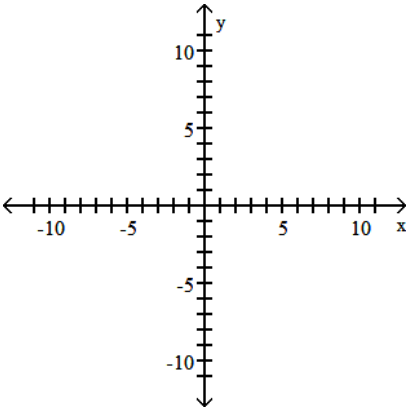
A) $16 B) $10 C) $57 D) $32

Answer: C

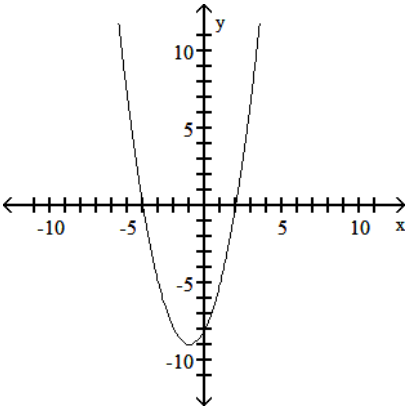
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

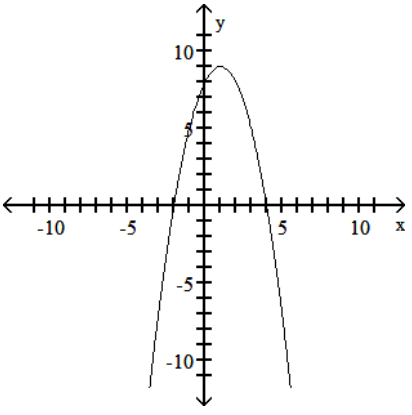
220) $f(x) = x^2 + 2x - 8$ 220) _____



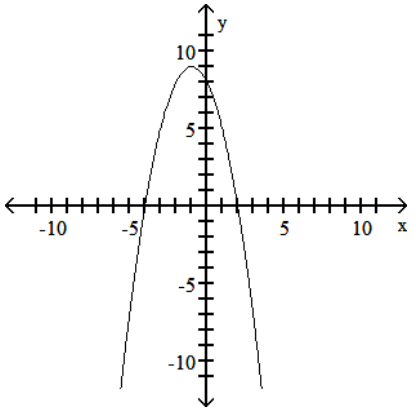
A) vertex (-1, -9); axis is x = -1;
x-intercepts are 2 and - 4; y-intercept is -8



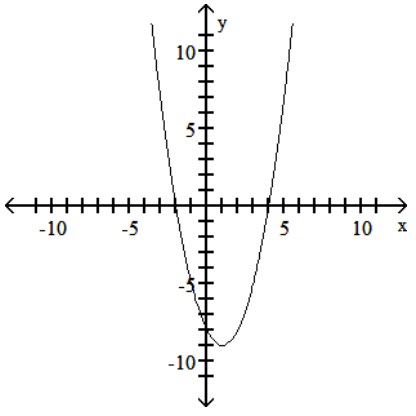
B) vertex (1, 9); axis is x = 1;
x-intercepts are -2 and 4; y-intercept is 8



C) vertex (-1, 9); axis is x = -1;
x-intercepts are 2 and - 4; y-intercept is 8



D) vertex (1, -9); axis is x = 1;
x-intercepts are -2 and 4; y-intercept is -8



Answer: A
Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

221) 221) _____

x	y
-1	3
1	1
5	2
9	9
12	-9

A) Function B) Not a function

Answer: A
Explanation: A)
B)

Solve the problem.

222) Use the formula $P = Ie^{kt}$. A bacterial culture has an initial population of 10,000. If its population declines to 7000 in 2 hours, what will it be at the end of 4 hours? 222) _____

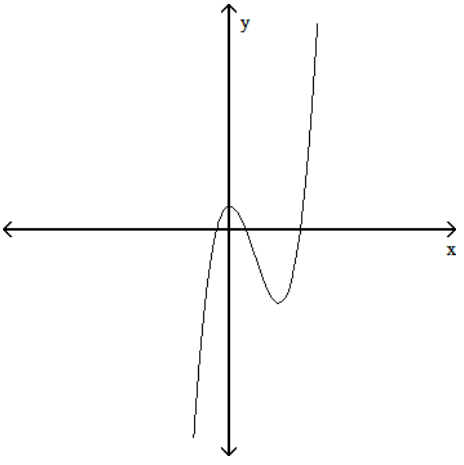
A) 1500 bacteria B) 9031 bacteria C) 2450 bacteria D) 4900 bacteria

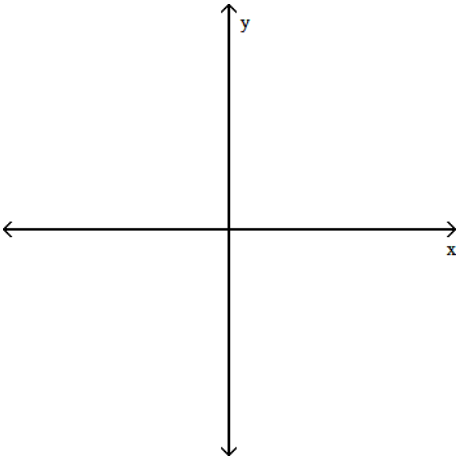
Answer: D

Explanation: A)
B)
C)
D)

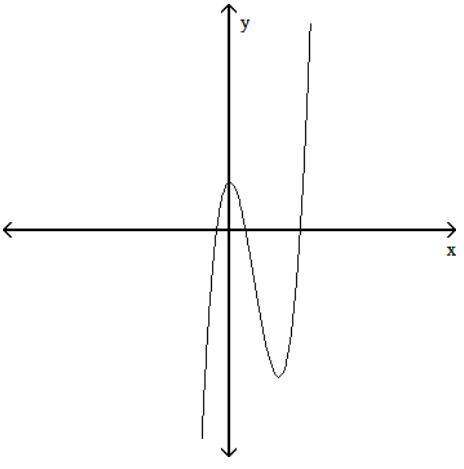
Graph the indicated new function, given the graph for y = f(x).

223) y = af(x), where a satisfies a < -1 223) _____

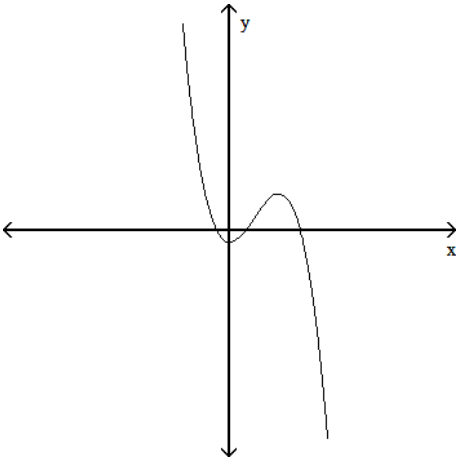




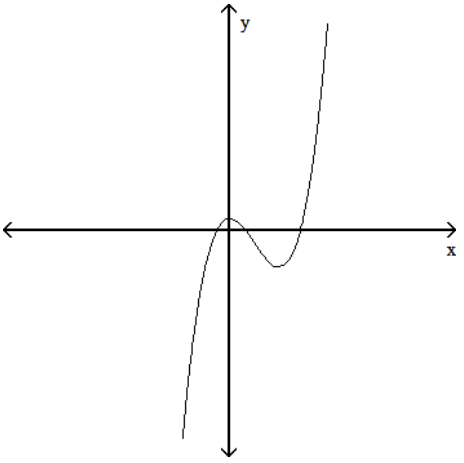
A)



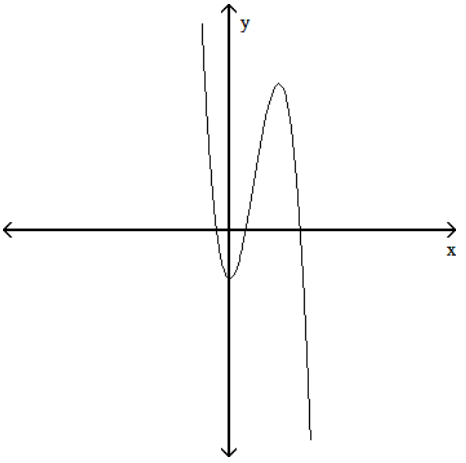
B)



C)



D)

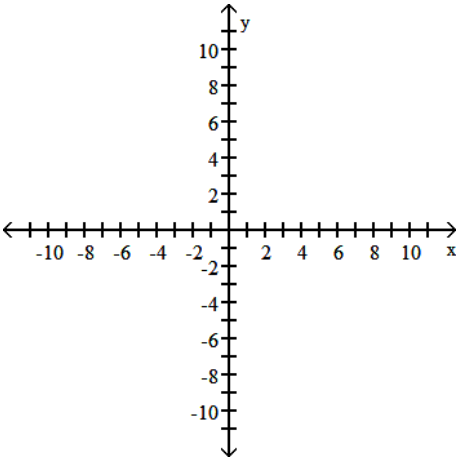


Answer: D

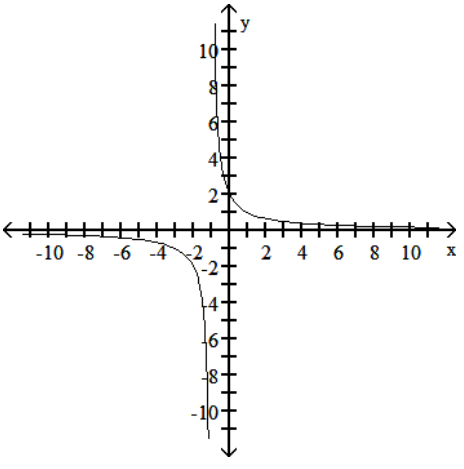
Explanation: A)
B)
C)
D)

Graph the rational function.

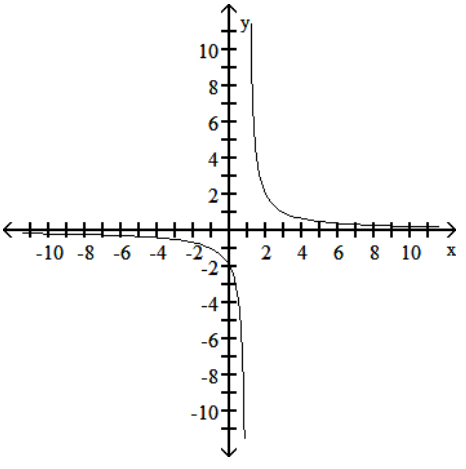
224) $y = \frac{2x}{x + 1}$ 224) _____



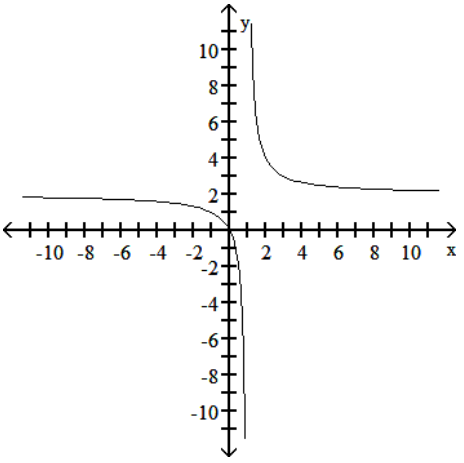
A)



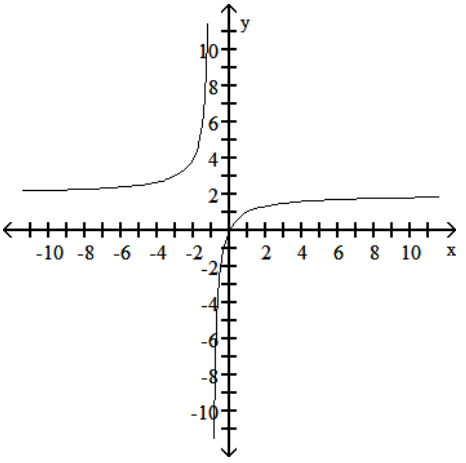
B)



C)



D)



Answer: D
Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

225) $\log_3 \frac{1}{3}$ 225) _____

A) 3 B) 1 C) 0 D) -1

Answer: D
Explanation: A)
B)
C)
D)

Find $\frac{f(x+h) - f(x)}{h}$.

226) $f(x) = 2x - 13$ 226) _____

A) 2 B) -2h C) $\frac{13}{2}$ D) 13

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

227) The length and width of a rectangle have a sum of 156. What dimensions will give the maximum area? 227) _____

A) 39 by 39 B) 39 by 117 C) 77 by 79 D) 78 by 78

Answer: D
Explanation: A)
B)
C)
D)

Find $\frac{f(x+h) - f(x)}{h}$.

228) $f(x) = 14 - 2x^3$ 228) _____

A) $-2(3x^2 - 3x - h)$ B) $-2(x^2 - xh - h^2)$

C) $-2(3x^2 + 3xh + h^2)$ D) $-3x^2$

Answer: C

Explanation: A)
B)
C)
D)

Evaluate the function.

229) $f(x) = x^2 - 5x - 3$; Find $f(-2)$. 229) _____

A) 11 B) -9 C) 17 D) -3

Answer: A

Explanation: A)
B)
C)
D)

Solve the equation.

230) $\log_9 x^2 = \log_9 (3x + 18)$ 230) _____

A) $\frac{2}{3}$ B) 6 C) 6, -3 D) No solution

Answer: C

Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

231) $e^{-0.03x} = 0.2$ 231) _____

A) 1.609 B) -6.667 C) 53.648 D) -53.648

Answer: C

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

232) $y = \frac{x + 10}{x - 1}$ 232) _____

A) Vertical asymptote at x = -1; horizontal asymptote at y = 1
B) Vertical asymptote at x = 1; horizontal asymptote at y = x
C) Vertical asymptote at x = 1; horizontal asymptote at y = 1
D) Vertical asymptote at x = -1; horizontal asymptote at y = 0

Answer: C
Explanation: A)
B)
C)
D)

Solve the problem.

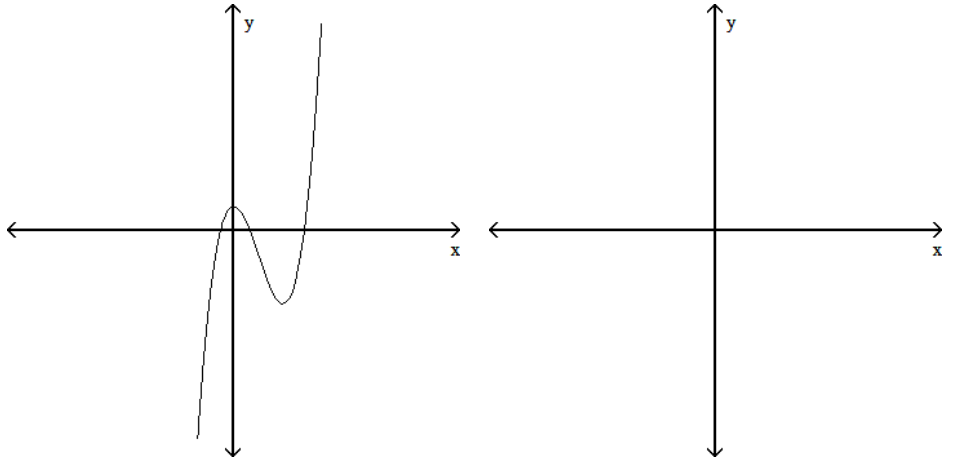
233) Sue wants to put a rectangular garden on her property using 80 meters of fencing. There is a river that runs through her property so she decides to increase the size of the garden by using the river as one side of the rectangle. (Fencing is then needed only on the other three sides.) Let x represent the length of the side of the rectangle along the river. Express the garden's area as a function of x. 233) _____

A) $A(x) = 40x - \frac{1}{2}x^2$
B) $A(x) = 40x^2 - x$
C) $A(x) = 39x - \frac{1}{4}x^2$
D) $A(x) = 41x - 2x^2$

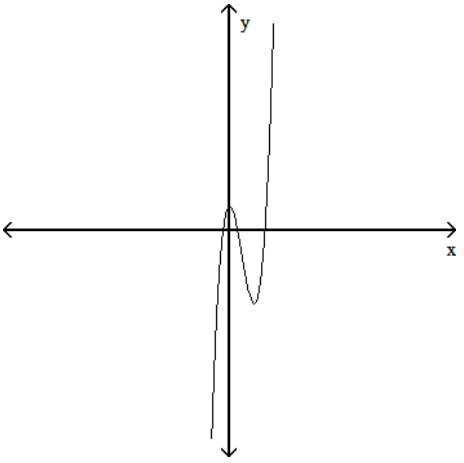
Answer: A
Explanation: A)
B)
C)
D)

Graph the indicated new function, given the graph for y = f(x).

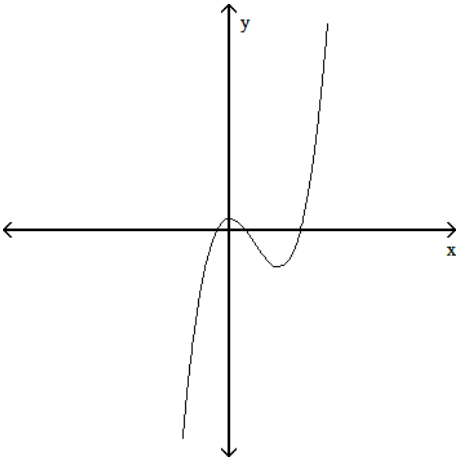
234) y = af(x), where a satisfies 0 < a < 1 234) _____



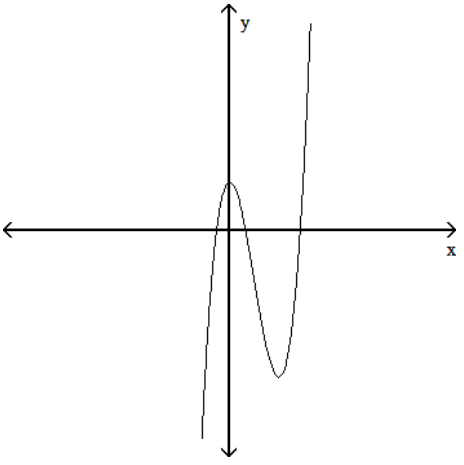
A)



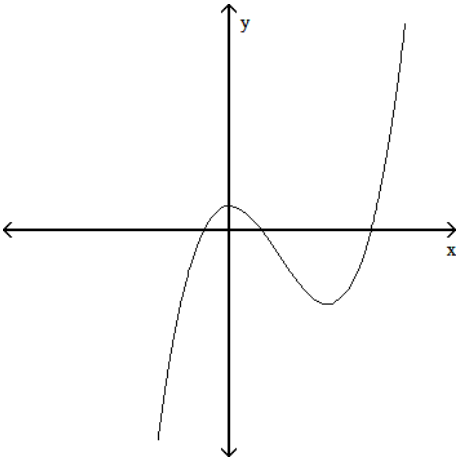
B)



C)



D)



Answer: B
Explanation: A)
B)
C)
D)

Write the logarithmic equation in exponential form.

235) $\log_3 \frac{1}{9} = -2$ 235) _____

A) $3^{-2} = \frac{1}{9}$ B) $3^9 = 2$ C) $2^3 = \frac{1}{9}$ D) $\left(\frac{1}{9}\right)^2 = 3$

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

236) An advertising agency has discovered that when the Holt Company spends x thousands of dollars on advertising, it results in a profit increase in thousands of dollars given by the function $P(x) = -\frac{1}{5}(x - 5)^2 + 60$. How much should the Holt Company spend on advertising to maximize the profit? 236) _____

A) $5000 B) $63,000 C) $60,000 D) $3000

Answer: A

Explanation: A)
B)
C)
D)

Solve the equation.

237) $\log (x + 4) = \log (2x + 5)$ 237) _____

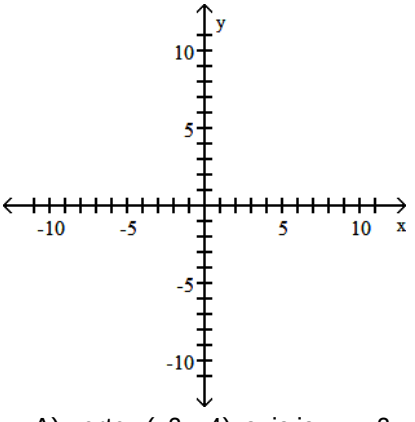
A) $-\frac{6}{5}$ B) 9 C) 1 D) -1

Answer: D

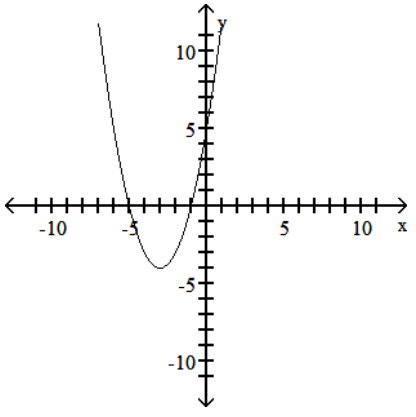
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

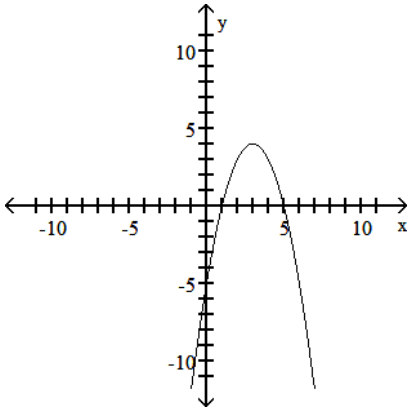
238) $f(x) = x^2 - 6x + 5$ 238) _____



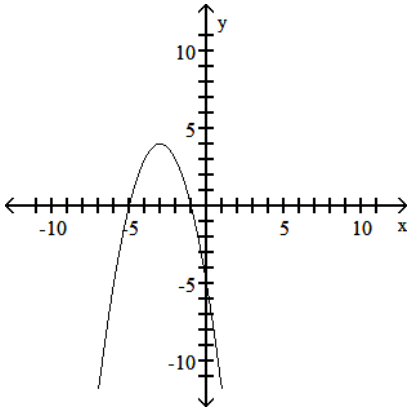
A) vertex (-3, -4); axis is x = -3;
x-intercepts are -5 and - 1; y-intercept is 5



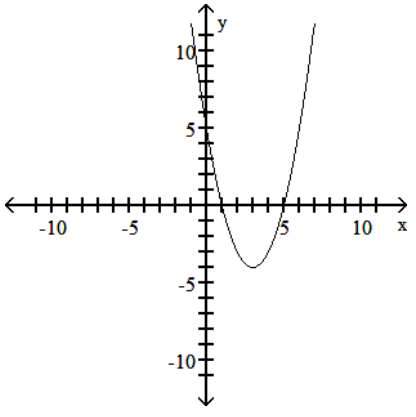
B) vertex (3, 4); axis is x = 3;
x-intercepts are 5 and 1; y-intercept is -5



C) vertex (-3, 4); axis is x = -3;
x-intercepts are -5 and - 1; y-intercept is -5



D) vertex (3, -4); axis is x = 3;
x-intercepts are 5 and 1; y-intercept is 5



Answer: D

Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

239) 3x + y = 11 239) _____

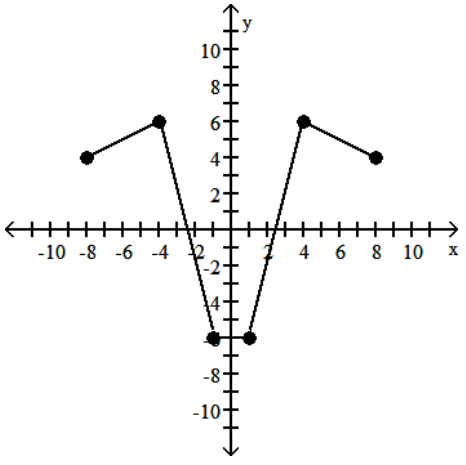
A) {-5, -8, -11, -14, -17}
B) {-5, -7, -9, -11, -13}
C) {13, 11, 9, 7, 5}
D) {17, 14, 11, 8, 5}

Answer: D

Explanation: A)
B)
C)
D)

Give the domain and range of the function.

240) 240) _____



A) Domain [-6, 6] ; Range [-8, 8]
B) Domain [-8, 8] ; Range [-6, 6]
C) Domain {-8, -4, -1, 1, 4, 8} ; Range {-6, 4, 6}
D) Domain {-6, 4, 6} ; Range {-8, -4, -1, 1, 4, 8}

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

241) Sonja and Chris both accept new jobs on March 1, 2001. Sonja starts at $43,000 with a raise each March 1 of 4%. Chris starts at $32,000 with a raise on March 1 of each year of 6%. In what year will Chris' salary exceed Sonja's? 241) _____

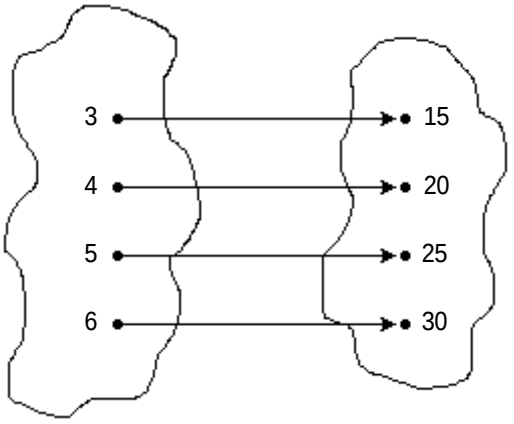
A) 2018 B) 2015 C) 2016 D) 2017

Answer: A

Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

242) X Y 242) _____



A) Function B) Not a function

Answer: A

Explanation: A)
B)

Find $\frac{f(x+h) - f(x)}{h}$.

243) $f(x) = 6x^2 + 12x - 13$ 243) _____

A) $12xh + 12h + 12h^2$ B) $6x + 6 + 12h$

C) $12x + 12$ D) $12x + 12 + 6h$

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

244) The polynomial function $L(p) = p^3 - 5p^2 + 20$ gives the rate of gas leakage from a tank as pressure increases in p units from its initial setting. Will an increase of 3 units result in a lower rate of leakage compared to the initial setting of $p = 0$? 244) _____

A) Yes B) No

Answer: A

Explanation: A)
B)

Give the domain of the function.

245) $f(x) = \frac{1}{\sqrt{x^2 + 5x - 14}}$ 245) _____

A) $(7, 2)$ B) $(-\infty, 2) \cup (7, \infty)$ C) $(-\infty, -7) \cup (2, \infty)$ D) $(-\infty, \infty)$

Answer: C

Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

246) $f(x) = 7x^3 - 4$ 246) _____

A) Even B) Odd C) Neither

Answer: C

Explanation: A)
B)
C)

Determine whether the rule defines y as a function of x.

247) $x = y^2 + 8$ 247) _____

A) Function B) Not a function

Answer: B

Explanation: A)
B)

Solve the problem.

248) Newton's law of cooling states that the temperature f(t) of a body at time t is given by: 248) _____

$f(t) = T_0 + Ce^{-kt}$, where C and k are constants and T_0 is the temperature of the environment in which the object rests. If
C = -30.9 and k = 0.04 and t is in hours, how long will it take for a frozen roast to thaw to a temperature of 0°C in a refrigerator that is at 5°C? Round your answer to the nearest hour.

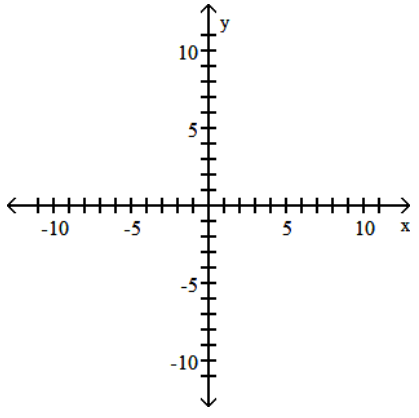
A) 46 hr B) 40 hr C) 50 hr D) 44 hr

Answer: A

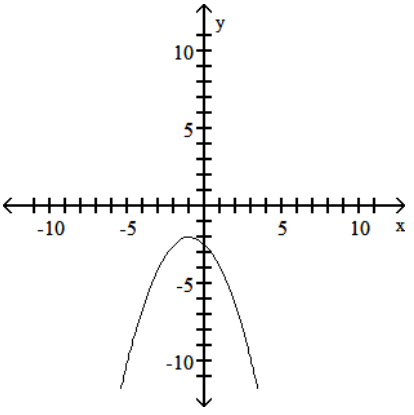
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

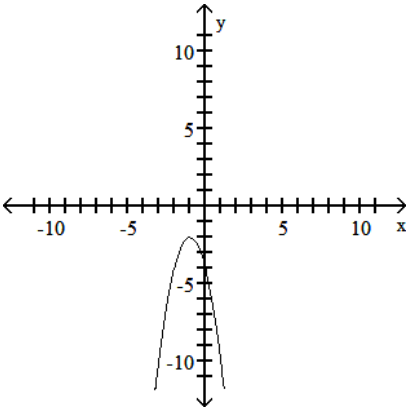
249) $f(x) = -2x^2 - 4x - 4$ 249) _____



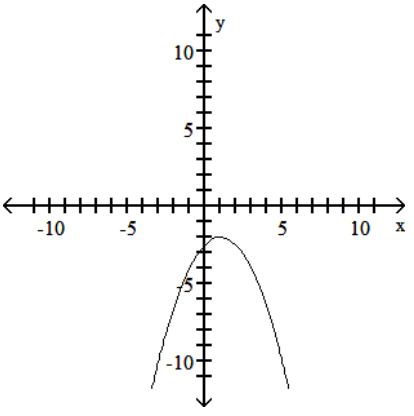
A) vertex (-1, -2); axis is x = -1;
no x-intercepts; y-intercept is $-\frac{5}{2}$



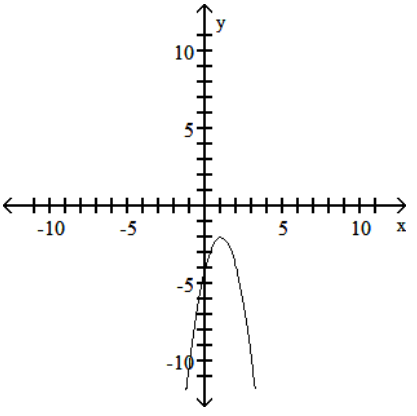
B) vertex (-1, -2); axis is x = -1;
no x-intercepts; y-intercept is -4



C) vertex (1, -2); axis is x = 1;
no x-intercepts; y-intercept is $-\frac{5}{2}$



D) vertex (1, -2); axis is x = 1;
no x-intercepts; y-intercept is -4



Answer: B
Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

250) $\log_9 \frac{1}{81}$ 250) _____

A) -2 B) -9 C) 2 D) 9

Answer: A
Explanation: A)
B)
C)
D)

Evaluate the function.

251) $f(x) = 3x^2 + 4x + 6$; Find f(a). 251) _____

A) $7a + 6$ B) $7a$ C) $3a^2 + 4a + 6$ D) $3a^2 + 4a$

Answer: C

Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

252) $y = x(x - 1)$ 252) _____

A) {-6, -2, 0, 2, 6} B) {0, 2, 6} C) {-8, -4, 0, 4, 8} D) {0, 4, 8}

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

253) If money can be invested at 4% compounded quarterly, which is larger -- $1000 now or the present value of $1210 left at 4% interest for 8 years? 253) _____

A) $1000 now B) Present value of $1210 left for 8 years

Answer: A

Explanation: A)
B)

Write the expression using base e rather than base 10.

254) $10^{x + 4}$ 254) _____

A) $(x + 4)e^{10}$ B) $e^{(\ln 10)(x + 4)}$ C) $10e^{x + 4}$ D) $e^{10(x + 4)}$

Answer: B

Explanation: A)
B)
C)
D)

Evaluate the function.

255) $f(x) = (x - 1)(x + 4)$; Find f(a). 255) _____

A) $a^2 + 4$ B) $a^2 - 4$ C) $(a - 1)(a + 4)$ D) $(a - 1)(a - 4)$

Answer: C

Explanation: A)
B)
C)
D)

256) $f(x) = -3x^2 + 2x - 2$; Find $f(r + h)$. 256) _____

A) $-3r^2 - 6rh - 3h^2 + 2r + 2h - 2$

B) $-3r^2 - 3rh - 3h^2 + 2r + 2h - 2$

C) $-3r^2 - 3h^2 - 4r - 4h - 2$

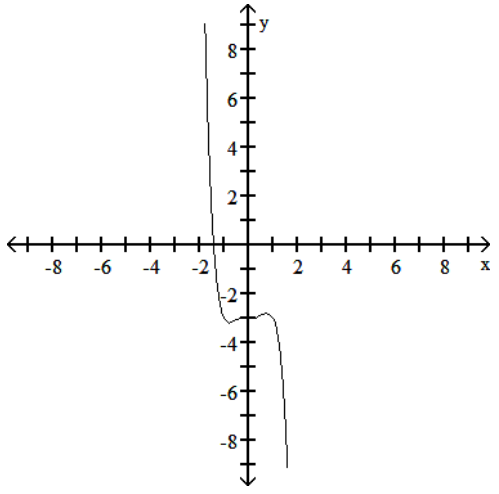
D) $-3r^2 - 3h^2 + 2r + 2h - 2$

Answer: A

Explanation: A)
B)
C)
D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

257) 257) _____



A) Can't identify degree; -

B) Degree is odd; -

C) Degree is even; +

D) Degree is even; -

Answer: B

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

258) $y = \frac{2}{4 - 6x}$ 258) _____

A) Vertical asymptote at $x = 2$; horizontal asymptote at $y = \frac{2}{3}$

B) Vertical asymptote at $x = 0$; horizontal asymptote at $y = \frac{2}{3}$

C) Vertical asymptote at $x = \frac{2}{3}$ horizontal asymptote at $y = 0$

D) Vertical asymptote at $x = \frac{2}{3}$; horizontal asymptote at $y = 2$

Answer: C

Explanation: A)
B)
C)
D)

Find the domain of the function.

259) $f(x) = \ln(-2 - x)$ 259) _____

A) $x < 2$ B) $x > 2$ C) $x < -2$ D) $x > -2$

Answer: C

Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

260) $y = -4x^2$ 260) _____

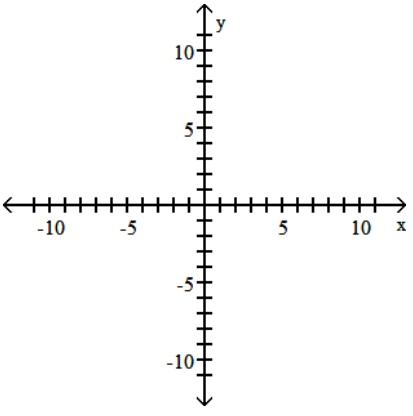
A) {0, 4, 16} B) {-16, -4, 0} C) {-4, 0, 4} D) {-16, 0, 16}

Answer: B

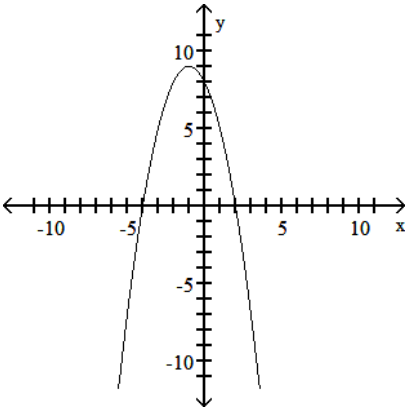
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

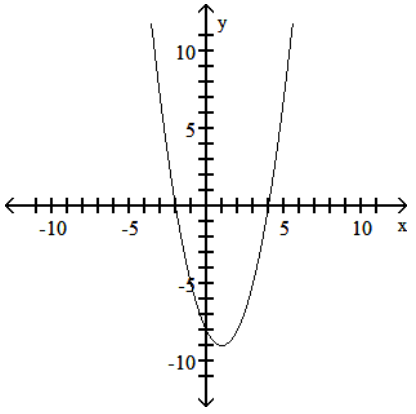
261) $f(x) = -x^2 + 2x + 8$ 261) _____



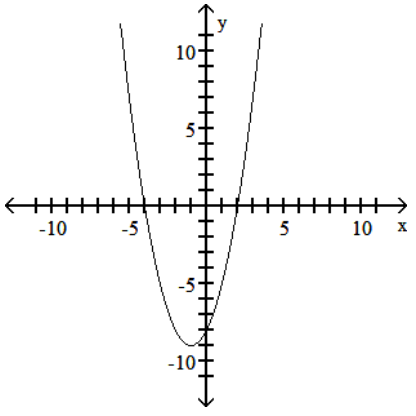
A) vertex (-1, 9); axis is x = -1;
x-intercepts are -4 and 2; y-intercept is 8



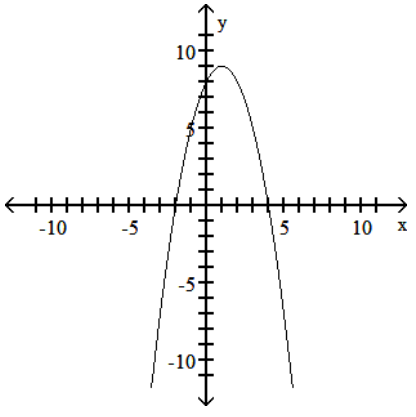
B) vertex (1, -9); axis is x = 1;
x-intercepts are 4 and - 2; y-intercept is -8



C) vertex (-1, -9); axis is x = -1;
x-intercepts are -4 and 2; y-intercept is -8



D) vertex (1, 9); axis is x = 1;
x-intercepts are 4 and - 2; y-intercept is 8



Answer: D

Explanation: A)
B)
C)
D)

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

262) $\log_{8.3} 4.8$ 262) _____

A) 0.578 B) 0.681 C) 1.349 D) 0.741

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

263) The territorial area of an animal is defined to be its defended region, or exclusive region. For example, a rhinoceros has a certain region over which it is ruler. The area T of that region, in acres, can be approximated by the function 263) _____

$T = W^{1.88}$,

where W is the weight of the animal, in tons. Find the approximate territorial area of a rhinoceros who weights 4.6 tons. Round to the nearest hundredth.

A) 0.05 acres B) 0.06 acres C) 18.24 acres D) 17.62 acres

Answer: D

Explanation: A)
B)
C)
D)

Solve the equation.

264) $\log_3 (5x + 5) = \log_3 (5x + 2)$ 264) _____

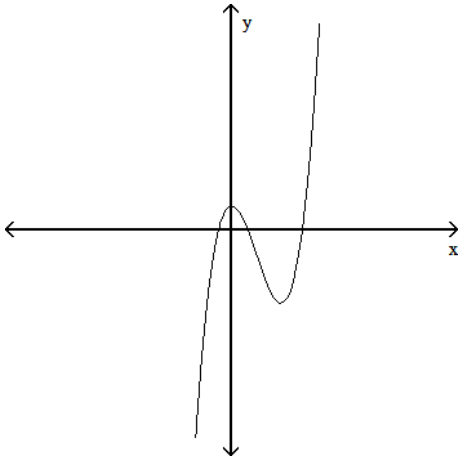
A) 0 B) $\frac{5}{2}$ C) $\frac{7}{3}$ D) No solution

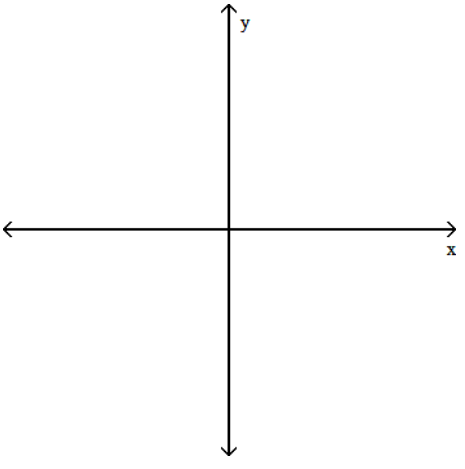
Answer: D

Explanation: A)
B)
C)
D)

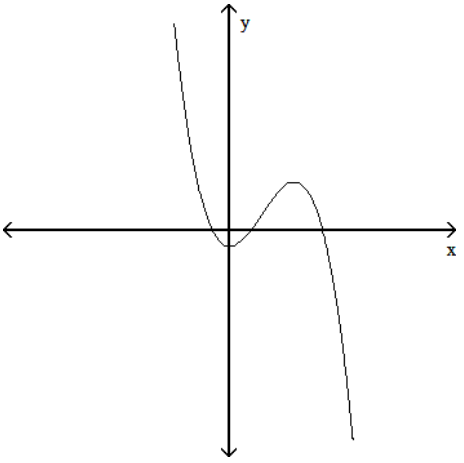
Graph the indicated new function, given the graph for y = f(x).

265) y = f(ax), where a satisfies a < -1 265) _____

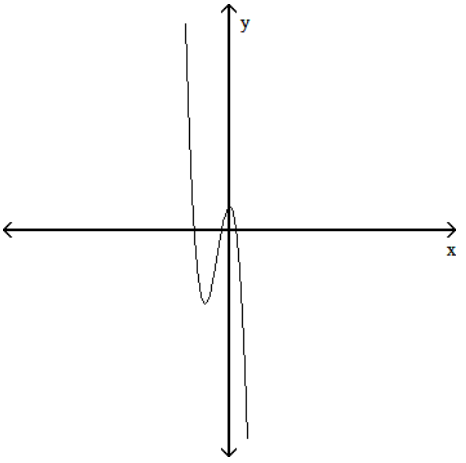




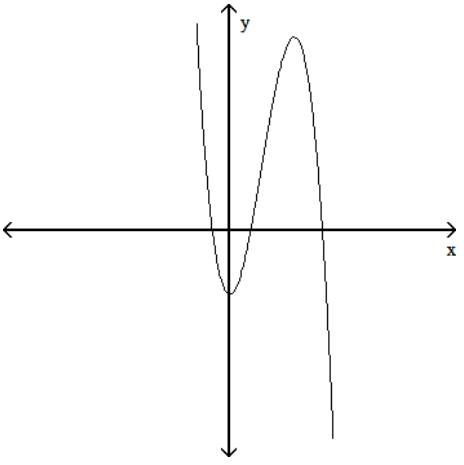
A)



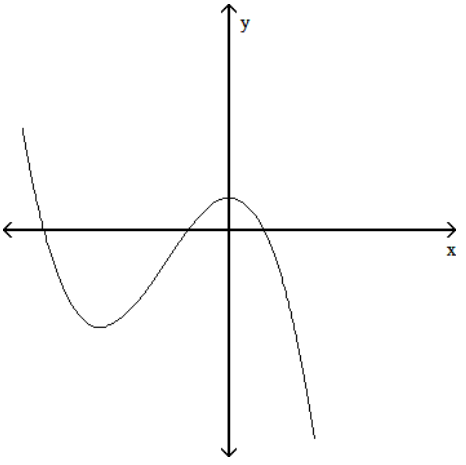
B)



C)



D)



Answer: B
Explanation: A)
B)
C)
D)

Solve the equation.

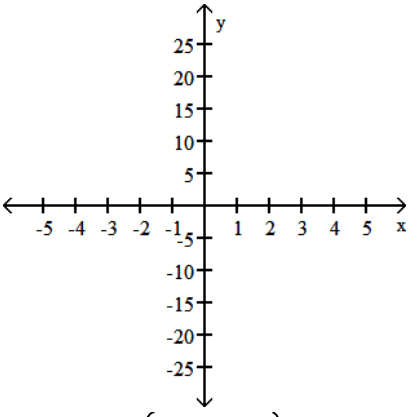
266) $2^{(1 + 2x)} = 8$ 266) _____

A) 2 B) 1 C) 4 D) -1

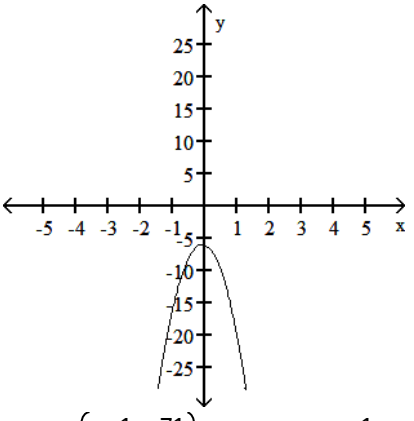
Answer: B
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

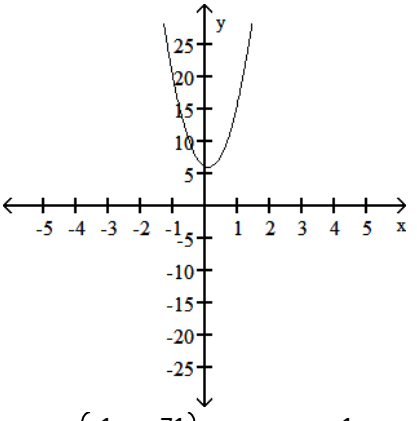
267) $f(x) = -12x^2 - 2x - 6$ 267) _____



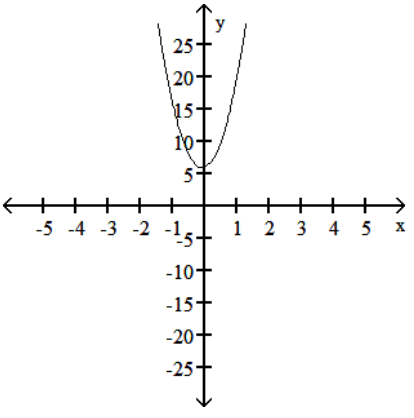
A) vertex $\left(-\frac{1}{12}, -\frac{71}{12}\right)$; axis is $x = -\frac{1}{12}$;
no x-intercepts; y-intercept is -6



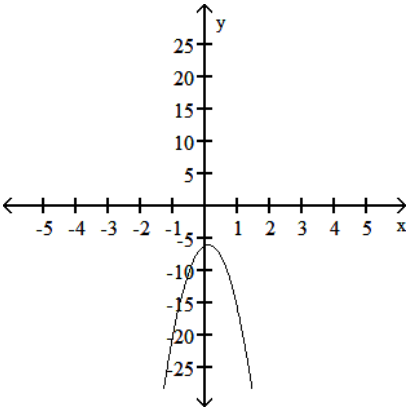
B) vertex $\left(\frac{1}{12}, \frac{71}{12}\right)$; axis is $x = \frac{1}{12}$;
no x-intercepts; y-intercept is 6



C) vertex $\left(-\frac{1}{12}, \frac{71}{12}\right)$; axis is $x = -\frac{1}{12}$;
no x-intercepts; y-intercept is 6



D) vertex $\left(\frac{1}{12}, -\frac{71}{12}\right)$; axis is $x = \frac{1}{12}$;
no x-intercepts; y-intercept is -6



Answer: A
Explanation: A)
B)
C)
D)

Find the domain of the function.

268) $f(x) = \ln(6x - x^2)$ 268) _____

A) $x \leq 6$ B) $-6 < x < 6$ C) $-6 \leq x < 0$ D) $0 < x < 6$

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

269) The number of mosquitoes M(x), in millions, in a certain area depends on the June rainfall x, in inches: $M(x) = 13x - x^2$. What rainfall produces the maximum number of mosquitoes? 269) _____

A) 0 in. B) 6.5 in. C) 169 in. D) 13 in.

Answer: B

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

270) $y = \dfrac{4x + 1}{x + 3}$ 270) _____

A) Vertical asymptote at $x = 3$; horizontal asymptote at $y = 4$

B) Vertical asymptote at $x = 4$; horizontal asymptote $y = -3$

C) Vertical asymptote at $x = -3$; horizontal asymptote at $y = 4$

D) Vertical asymptote at $x = -3$; horizontal asymptote at $y = -\dfrac{1}{4}$

Answer: C

Explanation: A)
B)
C)
D)

Give the domain of the function.

271) $f(x) = \dfrac{x^4 + 7}{x^2 - 4x - 21}$ 271) _____

A) $(-\infty, 7) \cup (7, 3) \cup (3, \infty)$ B) $(-\infty, -3) \cup (-3, -7) \cup (-7, \infty)$

C) $(-\infty, -7) \cup (-7, 3) \cup (3, \infty)$ D) $(-\infty, -3) \cup (-3, 7) \cup (7, \infty)$

Answer: D

Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

272) $\log_5 \frac{8\sqrt[3]{3}}{\sqrt[5]{6}}$ 272) _____

A) $\frac{\log_5 8 + 3\log_5 3}{5\log_5 6}$

B) $\frac{\log_5 8 + \frac{1}{3}\log_5 3}{\frac{1}{5}\log_5 6}$

C) $\log_5 8 + 3\log_5 3 - 5\log_5 6$

D) $\log_5 8 + \frac{1}{3}\log_5 3 - \frac{1}{5}\log_5 6$

Answer: D
Explanation: A)
B)
C)
D)

Evaluate the function for the given value.

273) $f(x) = \begin{cases} \frac{2x + 4}{x - 7} & \text{if } x \neq 7 \\ 9 & \text{if } x = 7 \end{cases}$; f(a) 273) _____

A) $\frac{(2a + 4)}{(a - 7)}$ if $a \neq 7$, 9 if $a = 7$

B) 2 if $a \neq 7$, 9 if $a = 7$

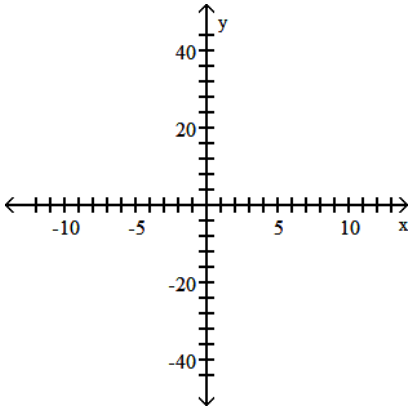
C) $\frac{(2a + 4)}{(a - 4)}$ if $a = 7$, 9 if $a \neq 7$

D) 0 if $a \neq 7$, 9 if $a = 7$

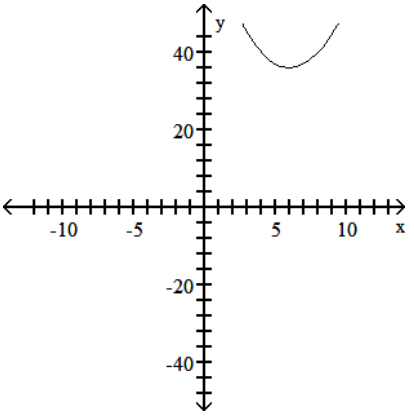
Answer: A
Explanation: A)
B)
C)
D)

Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

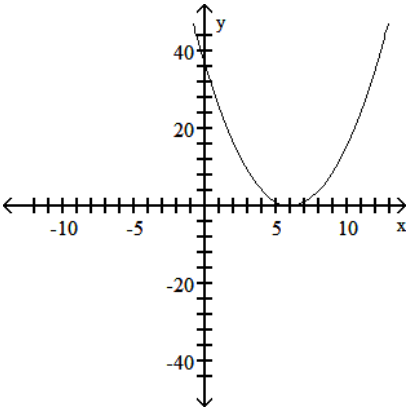
274) $f(x) = x^2 + 12x + 36$ 274) _____



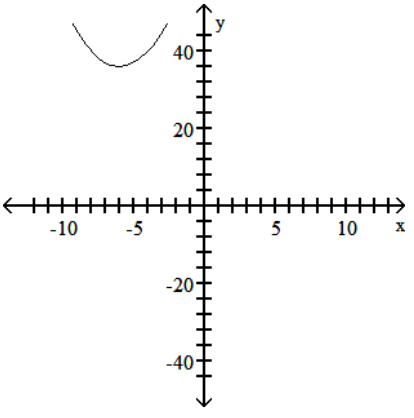
A) vertex (6, 36); axis is x = 6;
no x-intercepts; y-intercept is 72



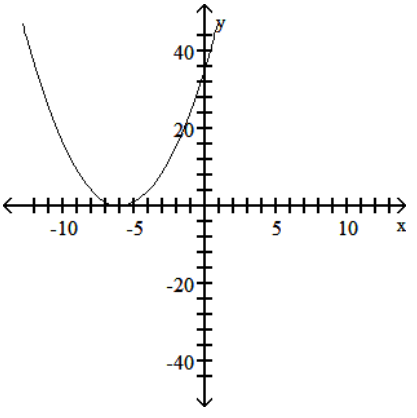
B) vertex (6, 0); axis is x = 6;
x-intercept is 6; y-intercept is 36



C) vertex (-6, 36); axis is x = -6;
no x-intercepts; y-intercept is 72



D) vertex (-6, 0); axis is x = -6;
x-intercept is -6; y-intercept is 36



Answer: D
Explanation: A)
B)
C)
D)

Evaluate the function.

275) $f(x) = \frac{x + 6}{x + 1}$; Find f(-1). 275) _____

A) $\frac{7}{2}$ B) 6 C) $\frac{5}{0}$ D) $-\frac{5}{2}$

Answer: C
Explanation: A)
B)
C)
D)

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

276) $\log_8 86$ 276) _____

A) 2.142 B) 0.467 C) 1.934 D) 10.750

Answer: A

Explanation: A)
B)
C)
D)

Provide an appropriate response.

277) True or False. The function $y = \frac{x^2 - 3^2}{x - 3}$ is continuous at $x = 3$. 277) _____

A) True B) False

Answer: B

Explanation: A)
B)

Solve the problem.

278) When pouring water from one five gallon bucket to another, a person tends to pour at a faster rate at first and then slow down in order not to spill. The amount of water left in the original bucket can be approximated by 278) _____

$f(t) = 5 - 0.80t^{0.60}$,

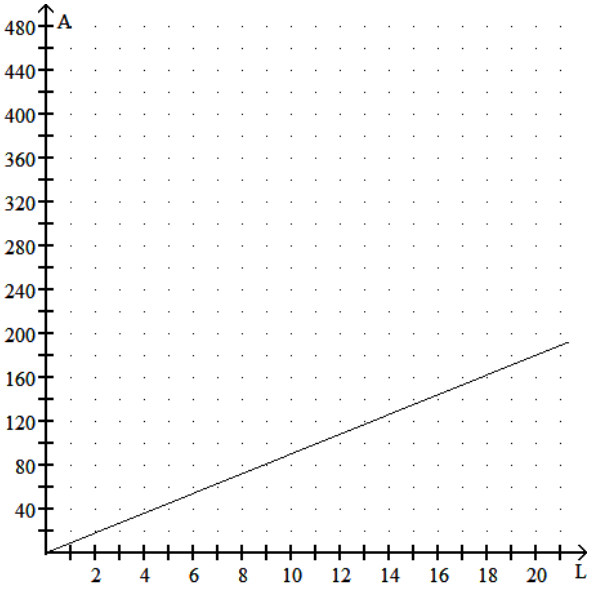
where f(t) is measured in gallons and t is the time spent pouring in seconds. Find the approximate amount of water left in the original bucket after 6 seconds of pouring. Round to the nearest hundredth.

A) 2.66 gal B) 2.34 gal C) 4.4 gal D) 4.2 gal

Answer: A

Explanation: A)
B)
C)
D)

279) The graph shows the relationship between the area A of a rectangle and the length L, if the width is fixed. Find the area if the length is 8 cm. 279) _____

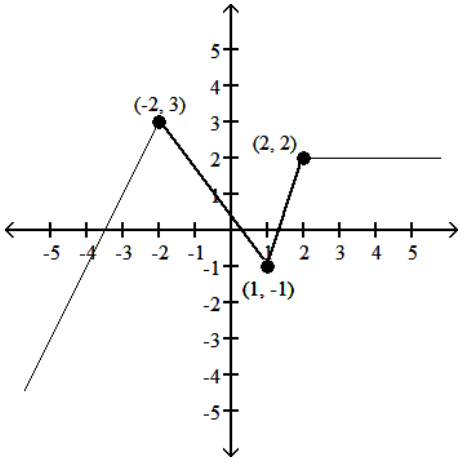


A) 54 cm^2 B) 45 cm^2 C) 72 cm^2 D) 90 cm^2

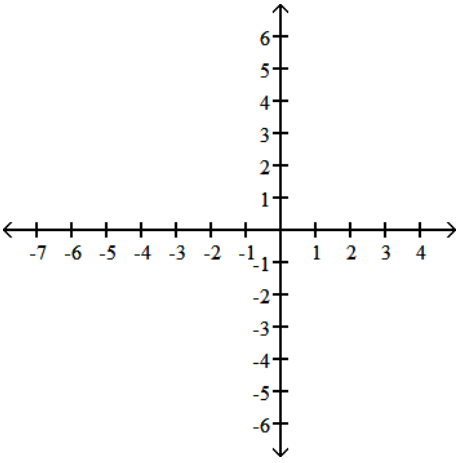
Answer: C

Explanation: A)
B)
C)
D)

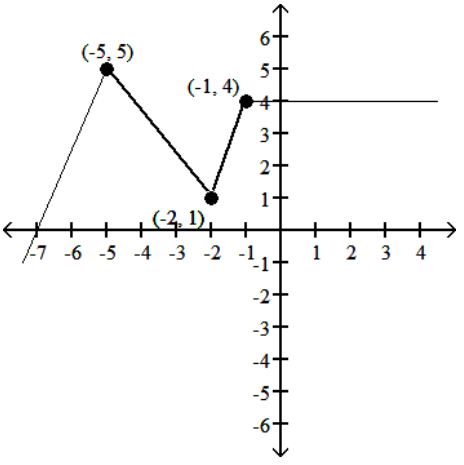
Using the graph below, sketch the graph of the given function.



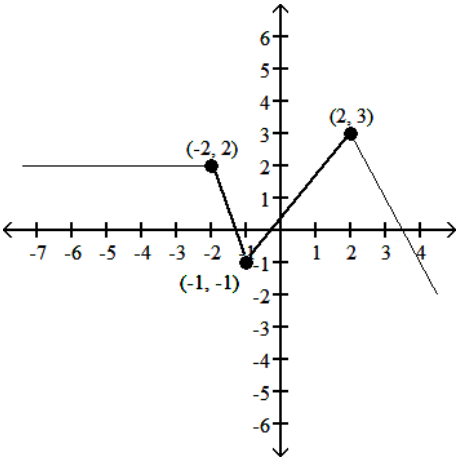
280) y = f(x + 2) -1 280) _____



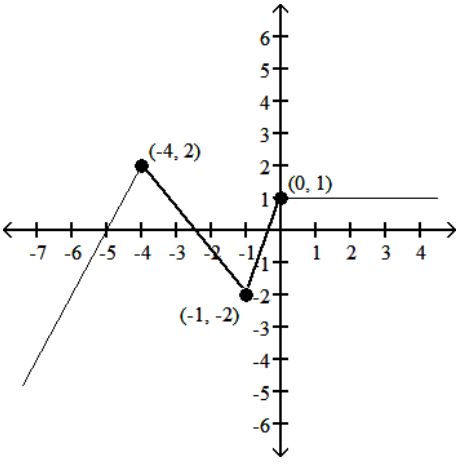
A)



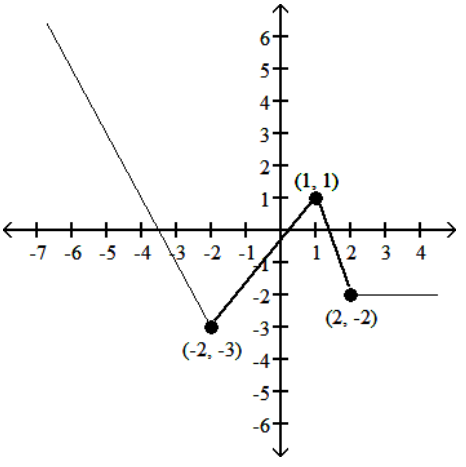
B)



C)



D)



Answer: C

Explanation: A)
B)
C)
D)

Solve the problem.

281) The purchasing power of a dollar is decreasing at the rate of 2.9% annually, compounded continuously. How long will it take for the purchasing power of $1.00 to be worth $0.79? Round to the nearest hundredth. 281) _____

A) 27.24 yr B) 0.81 yr C) 0.08 yr D) 8.13 yr

Answer: D

Explanation: A)
B)
C)
D)

282) A certificate of deposit pays 6.5% interest compounded quarterly. What effective interest rate does the CD pay? Round to the nearest tenth when necessary. 282) _____

A) 7.4% B) 6.7% C) 28.6% D) 5.6%

Answer: B

Explanation: A)
B)
C)
D)

Give the domain of the function.

283) $f(x) = (-x - 4)^{1/2}$ 283) _____

A) $(-\infty, 4]$ B) $[4, \infty)$ C) $[-4, \infty)$ D) $(-\infty, -4]$

Answer: D

Explanation: A)
B)
C)
D)

Write the expression using base e rather than base 10.

284) 10^{x^4} 284) _____

A) e^{10x^4} B) x^4e^{10} C) $10e^{x^4}$ D) $e^{(\ln 10)x^4}$

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

285) A bacteria colony doubles in 5 hr. How long does it take the colony to triple? Use $N = N_0\, 2^{t/T}$, where N_0 is the initial number of bacteria and T is the time in hours it takes the colony to double. (Round to the nearest hundredth, as necessary.) 285) _____

A) 7.5 hr B) 7.92 hr C) 2.03 hr D) 15 hr

Answer: B

Explanation: A)
B)
C)
D)

Evaluate the function.

286) $f(x) = x^2 - 3x - 5$; Find f(0). 286) _____

A) 25 B) 5 C) 0 D) -5

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

287) Southwest Dry Cleaners believes that it will need new equipment in 10 years. The equipment will cost $26,000. What lump sum should be invested today at 6% compounded semiannually, to yield $26,000? Round to the nearest cent. 287) _____

A) $19,282.85 B) $19,427.47 C) $22,224.25 D) $14,395.57

Answer: D

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

288) $y = \frac{5x + 5}{4 - 2x}$ 288) _____

A) Vertical asymptote at $x = \frac{5}{2}$; horizontal asymptote at y = 2

B) Vertical asymptote at x = 2; horizontal asymptote at $y = -\frac{5}{2}$

C) Vertical asymptote at x = 2; horizontal asymptote at y = -5

D) Vertical asymptote at x = 2; horizontal asymptote at $y = \frac{5}{2}$

Answer: B

Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

289) $\ln e^{4/3}$ 289) _____

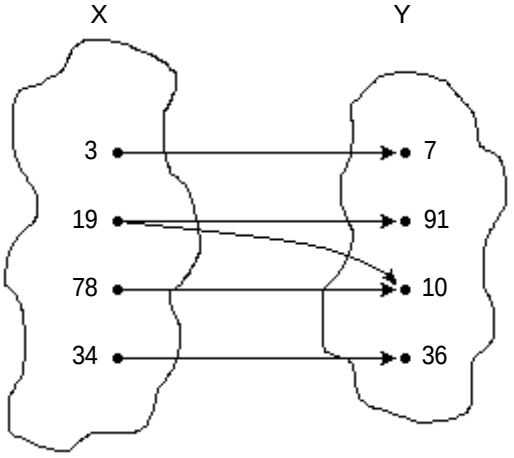
A) $\frac{4}{3}e$ B) $\frac{4}{3}$ C) $\frac{3}{4}$ D) $\frac{3}{4}e$

Answer: B

Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

290) 290) _____



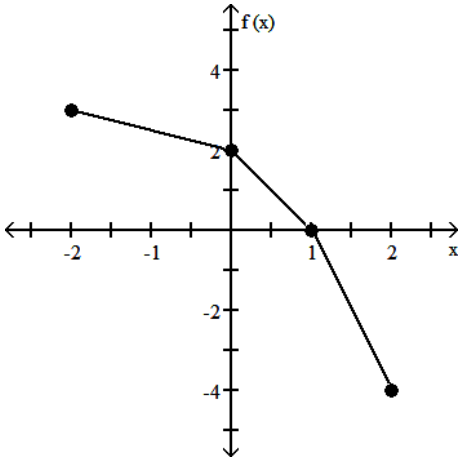
A) Function B) Not a function

Answer: B

Explanation: A)
B)

Use the graph to evaluate the function f(x) at the indicated value of x.

291) Find f(1.5). 291) _____



A) -1 B) 0.5

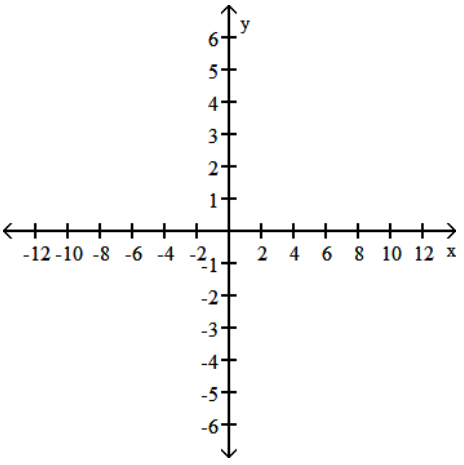
C) -2 D) None of these are correct.

Answer: C

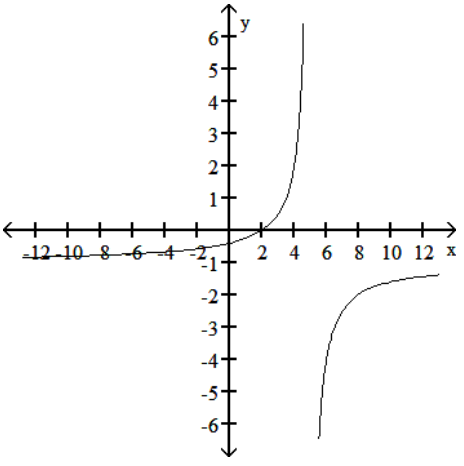
Explanation: A)
B)
C)
D)

Graph the rational function.

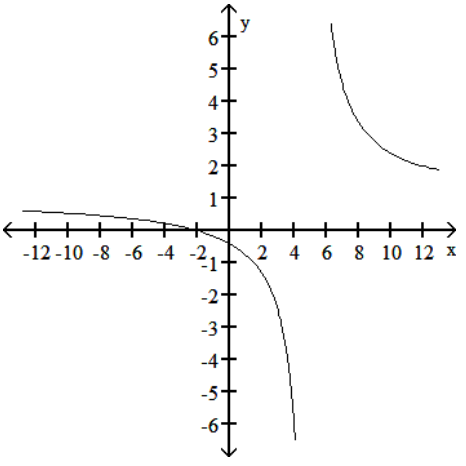
292) $y = \frac{x - 2}{x + 5}$ 292) _____



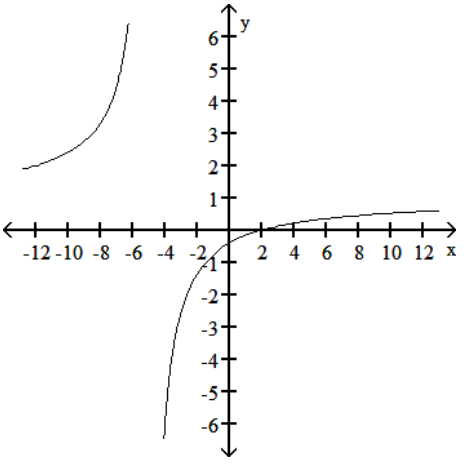
A)



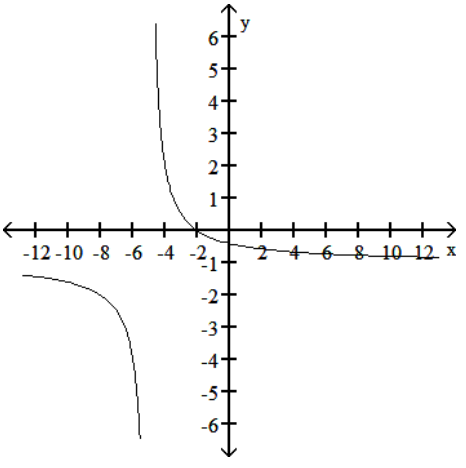
B)



C)



D)



Answer: C

Explanation: A)
B)
C)
D)

Solve the problem.

293) Find the interest earned on $8000 invested for 6 years at 7.2% interest compounded quarterly. Round to the nearest cent. 293) _____

A) $12,275.43 B) $1.53 C) $4275.43 D) $1909.76

Answer: C

Explanation: A)
B)
C)
D)

294) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 68x + 81$, where is x the number of hotdogs. How many hotdogs must he sell to earn the most profit? 294) _____

A) 81 hotdogs B) 47 hotdogs C) 34 hotdogs D) 68 hotdogs

Answer: C

Explanation: A)
B)
C)
D)

Give the domain of the function.

295) $f(x) = \sqrt{16 - x}$ 295) _____

A) [0, 16] B) $(-\infty, 16]$
C) $(-\infty, \infty)$ D) $(-\infty, 16) \cup (16, \infty)$

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

296) Barbara knows that she will need to buy a new car in 6 years. The car will cost $15,000 by then. How much should she invest now at 6%, compounded quarterly, so that she will have enough to buy a new car? Round to the nearest cent. 296) _____

A) $9975.86 B) $10,493.16 C) $11,208.87 D) $12,562.26

Answer: B

Explanation: A)
B)
C)
D)

297) Assume the cost of a car is $15,000. With continuous compounding in effect,find the number of years it would take to double the cost of the car at an annual inflation rate of 5%. Round to the nearest hundredth. 297) _____

A) 206.18 yr B) 1.92 yr C) 13.86 yr D) 192.32 yr

Answer: C

Explanation: A)
B)
C)
D)

298) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 2x^2 - 16x + 229$, where x is the number of watches repaired. What is his minimum cost? 298) _____

A) $205 B) $197 C) $410 D) $394

Answer: B

Explanation: A)
B)
C)
D)

Rewrite the expression as a sum, difference, or product of simpler logarithms.

299) $\log_4 xy$ 299) _____

A) $\log_2 x + \log_2 y$ B) $\log_2 x - \log_2 y$ C) $\log_4 x + \log_4 y$ D) $\log_4 x - \log_4 y$

Answer: C

Explanation: A)
B)
C)
D)

Solve the problem.

300) A hummingbird adds 13 grams per day to its base body weight of 5 grams during the spring migration. Let T(x) represent the hummingbird's weight after x days. Find $T\left(2\frac{1}{2}\right)$. 300) _____

A) 44 g B) 37.50 g C) 31 g D) 26 g

Answer: B

Explanation: A)
B)
C)
D)

Evaluate the logarithm without using a calculator.

301) ln e 301) _____

A) 1 B) -1 C) e D) 0

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

302) Find the effective rate corresponding to the nominal rate. 6% compounded monthly. Round to the nearest hundredth. 302) _____

A) 6.26% B) 6.17% C) 6.23% D) 6.12%

Answer: B

Explanation: A)
B)
C)
D)

303) Suppose a cost-benefit model is given by $y = \frac{6.3x}{100 - x}$, where y is the cost in thousands of dollars for removing x percent of a given pollutant. Find the cost of removing 55% to the nearest dollar. 303) _____

A) $3465 B) $6300 C) $1222 D) $7700

Answer: D

Explanation: A)
B)
C)
D)

Evaluate the function for the given value.

304) $f(x) = \begin{cases} \frac{2x + 2}{x - 5} & \text{if } x \neq 5 \\ 9 & \text{if } x = 5 \end{cases}$; $f\left(\frac{2}{m}\right)$ 304) _____

A) $\frac{2}{m}$ if $m \neq \frac{2}{5}$, 9 if $m = \frac{2}{5}$ B) 2 if $m \neq \frac{2}{5}$, 9 if $m = \frac{2}{5}$

C) $\frac{(4 + 2m)}{(2 - 5m)}$ if $m \neq \frac{2}{5}$, 9 if $m = \frac{2}{5}$ D) $\frac{(4m + 2)}{(2m - 5)}$ if $m \neq \frac{2}{5}$, 9 if $m = \frac{2}{5}$

Answer: C

Explanation: A)
B)
C)
D)

Give the domain of the function.

305) $f(x) = 5x^2 + 3x + 1$ 305) _____

A) $(-\infty, 0)$ B) $(0, \infty)$ C) $(-\infty, \infty)$ D) $(-\infty, 0) \cup (0, \infty)$

Answer: C

Explanation: A)
B)
C)
D)

Solve the equation.

306) $5^{-x} = \frac{1}{125}$ 306) _____

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

Answer: D

Explanation: A)
B)
C)
D)

307) $2^{(5 + 3x)} = \frac{1}{16}$ 307) _____

A) 3 B) $\frac{1}{8}$ C) 8 D) -3

Answer: D
Explanation: A)
B)
C)
D)

308) $5^x = 125$ 308) _____

A) 2 B) 25 C) 4 D) 3

Answer: D
Explanation: A)
B)
C)
D)

309) log 3x = log 4 + log (x + 2) 309) _____

A) 8 B) -8 C) 3 D) $\frac{8}{7}$

Answer: B
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

310) y = x + 7 310) _____

A) {5, 6, 7, 8, 9} B) {-2, -1, 0, 1, 2} C) {5, 7, 9, 11, 13} D) {-5, -3, -1, 1, 3}

Answer: A
Explanation: A)
B)
C)
D)

Solve the problem.

311) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. An artifact is discovered at a certain site. If it has 46% of the carbon-14 it originally contained, what is the approximate age of the artifact, rounded to the nearest year? (carbon-14 decays at the rate of 0.0125% annually.) 311) _____

A) 3680 yr B) 6212 yr C) 4320 yr D) 2698 yr

Answer: B
Explanation: A)
B)
C)
D)

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

312) $y = \frac{x - 5}{x + 5}$ 312) _____

A) $\left\{-\frac{7}{5}, -\frac{3}{4}, -1, -\frac{2}{3}, -\frac{3}{7}\right\}$ B) $\left\{-\frac{7}{6}, -\frac{3}{4}, 1, -\frac{2}{5}, -\frac{3}{8}\right\}$

C) $\left\{-\frac{7}{4}, -\frac{3}{2}, 1, -\frac{2}{5}, -\frac{3}{8}\right\}$ D) $\left\{-\frac{7}{3}, -\frac{3}{2}, -1, -\frac{2}{3}, -\frac{3}{7}\right\}$

Answer: D

Explanation: A)
B)
C)
D)

Find the asymptotes of the function.

313) $y = \frac{-5}{x - 1}$ 313) _____

A) Vertical asymptote at x = 1; horizontal asymptote at y = 0
B) Vertical asymptote at x = -1; horizontal asymptote at y = -5
C) Vertical asymptote at x = 1; horizontal asymptote at y = -5
D) Vertical asymptote at x = -1; horizontal asymptote at y = 0

Answer: A

Explanation: A)
B)
C)
D)

Solve the problem.

314) The number of dislocated electric impulses per cubic inch in a transformer increases when lightning strikes by $D = 3400(4)^x$, where x is the time in milliseconds of the lightning strike. Find the number of dislocated impulses at x = 0 and x = 2. 314) _____

A) 3400; 870,400 B) 13,600; 54,400 C) 3400; 27,200 D) 3400; 54,400

Answer: D

Explanation: A)
B)
C)
D)

315) The decay of 433 mg of an isotope is given by $A(t) = 433e^{-0.026t}$, where t is time in years. Find the amount left after 5 years. 315) _____

A) 380 mg B) 190 mg C) 370 mg D) 422 mg

Answer: A

Explanation: A)
B)
C)
D)

316) In the formula $A(t) = A_0e^{kt}$, A(t) is the amount of radioactive material remaining from an initial amount A_0 at a given time t and k is a negative constant determined by the nature of the material. A certain radioactive isotope decays at a rate of 0.1% annually. Determine the half-life of this isotope, to the nearest year. 316) _____

A) 693 yr B) 7 yr C) 301 yr D) 500 yr

Answer: A

Explanation: A)
B)
C)
D)

317) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by $y = \frac{262,500}{x + 525}$. What is the cost for x = 400? 317) _____

A) $200,000.00 B) $131.25 C) $113,513.51 D) $283.78

Answer: C

Explanation: A)
B)
C)
D)

318) Find the present value of the deposit. $13,000 at 8% compounded continuously for 10 years. Round to the nearest dollar. 318) _____

A) $199,120 B) $5841 C) $73,022 D) $235,522

Answer: B

Explanation: A)
B)
C)
D)

Find $\frac{f(x + h) - f(x)}{h}$.

319) $f(x) = \frac{2}{x}$ 319) _____

A) 0 B) $-\frac{2}{x(x + h)}$ C) $-\frac{2}{(x + h)}$ D) $-\frac{h}{x(x + h)}$

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

320) Find the present value of the deposit. $5000 at 6% compounded quarterly for 5 years. Round to the nearest cent. 320) _____

A) $3742.35 B) $6734.28 C) $3712.35 D) $6704.28

Answer: C

Explanation: A)
B)
C)
D)

Use natural logarithms to evaluate the logarithm to the nearest thousandth.

321) $\log_4 0.518$ 321) _____

A) 7.722 B) -0.286 C) -2.108 D) -0.474

Answer: D

Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

322) Let $\log_b A = 2$ and $\log_b B = -6$. Find $\log_b \frac{A}{B}$. 322) _____

A) $\frac{1}{3}$ B) $-\frac{1}{3}$ C) -4 D) 8

Answer: D

Explanation: A)
B)
C)
D)

Solve the problem.

323) How long will it take for prices in the economy to double at a 4% annual inflation rate? Round to the nearest hundredth when necessary. 323) _____

A) 23.45 yr B) 14.21 yr C) 17.67 yr D) 28.01 yr

Answer: C

Explanation: A)
B)
C)
D)

324) Coyotes are one of the few species of North American animals with an expanding range. The future population of coyotes in a region of Mississippi can be modeled by the equation $P = 44 + 20 \ln(19t + 1)$, where t is time in years. Use the equation to determine when the population will reach 180. (Round to the nearest tenth of a year.) 324) _____

A) 47.3 yr B) 47.4 yr C) 47.2 yr D) 332,082.8 yr

Answer: C

Explanation: A)
B)
C)
D)

325) Find the present value of the deposit. $500 at 7% compounded continuously for 10 years. Round to the nearest dollar. 325) _____

A) $248 B) $10,690 C) $3547 D) $7240

Answer: A

Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

326) $6e^{3x+2} = 9$ 326) _____

A) 1.378 B) -0.532 C) -2.712 D) -2.442

Answer: B

Explanation: A)
B)
C)
D)

Solve the problem.

327) If an object is thrown upward with an initial velocity of 13 feet per second, then its height is given by $h = -13t^2 + 104t$. What is its maximum height? 327) _____

A) 312 ft B) 208 ft C) 156 ft D) 104 ft

Answer: B

Explanation: A)
B)
C)
D)

Use the properties of logarithms to find the value of the expression.

328) Let $\log_b A = 5$ and $\log_b B = -2$. Find $\log_b \sqrt[5]{AB}$. 328) _____

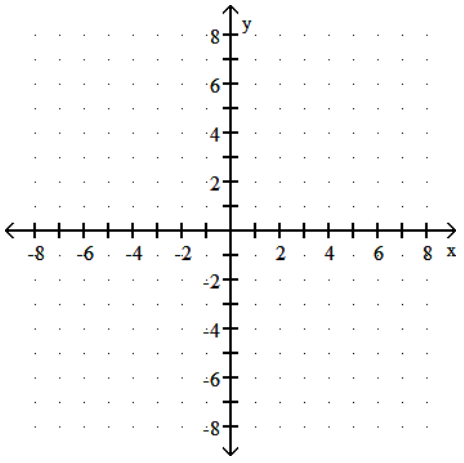
A) 0.600 B) 1.585 C) $5\sqrt{-10}$ D) -1.585

Answer: A

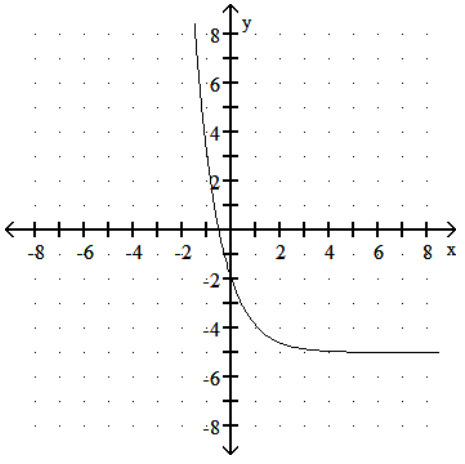
Explanation: A)
B)
C)
D)

Graph the function.

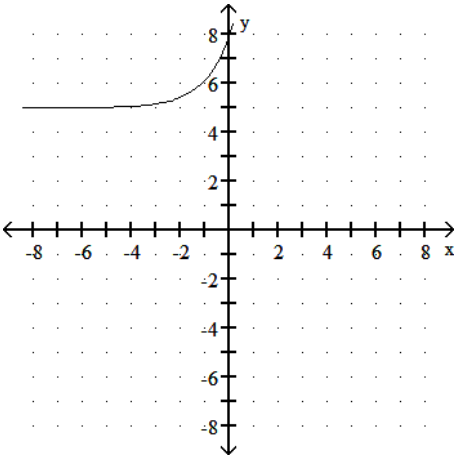
329) $y = 3e^{-x} - 5$ 329) _____



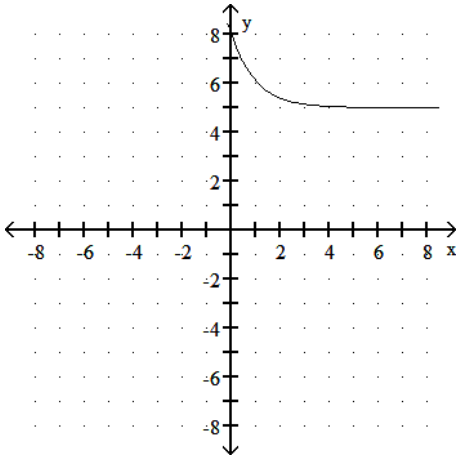
A)



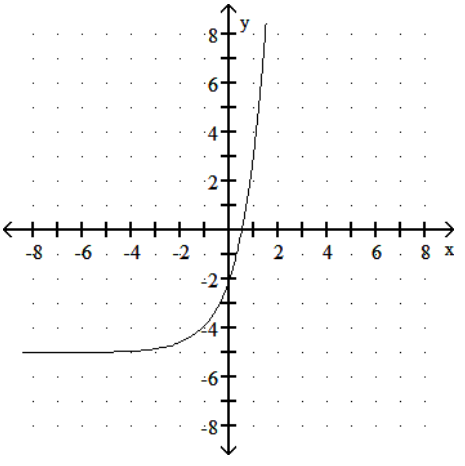
B)



C)



D)



Answer: A

Explanation: A)

B)

C)

D)

Solve the problem.

330) Find the interest earned on $12,000 invested for 5 years at 6.7% interest compounded monthly. Round to the nearest cent. 330) _____

A) $4759.66 B) $4596.00 C) $4769.02 D) $4728.80

Answer: A

Explanation: A)
B)
C)
D)

331) Suppose the cost of producing x items is given by $C(x) = 1000 - x^3$ and the revenue made on the sale of x items is $R(x) = 100x - 10x^2$. Find the number of items which serves as a break-even point. 331) _____

A) 25 items B) 100 items C) 10 items D) 5 items

Answer: C

Explanation: A)
B)
C)
D)

332) The sales of a mature product (one which has passed its peak) will decline by the function $S(t)= S_0e^{-at}$, where t is time in years. Find the sales after 6 years if a = 0.24 and S_0 = 12,100. Round to the nearest sale. 332) _____

A) 2867 sales B) 2255 sales C) 9518 sales D) 1434 sales

Answer: A

Explanation: A)
B)
C)
D)

333) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -15t^2 + 480t$. What is its maximum height? 333) _____

A) 3840 ft B) 5760 ft C) 1920 ft D) 2880 ft

Answer: A

Explanation: A)
B)
C)
D)

Solve the equation. Round decimal answers to the nearest thousandth.

334) $3^{(3x - 2)} = 25$ 334) _____

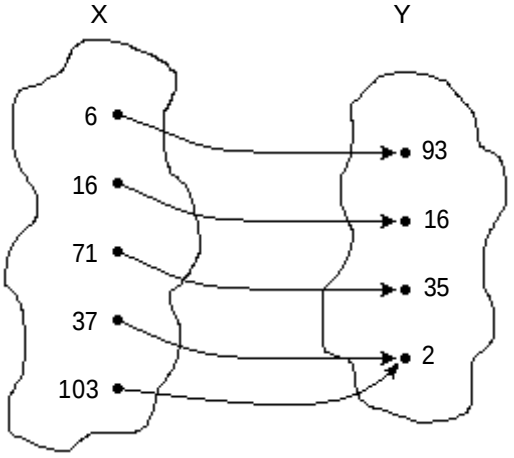
A) 1.373 B) 3.444 C) 0.310 D) 1.643

Answer: D

Explanation: A)
B)
C)
D)

Determine whether the rule defines y as a function of x.

335) 335) _____



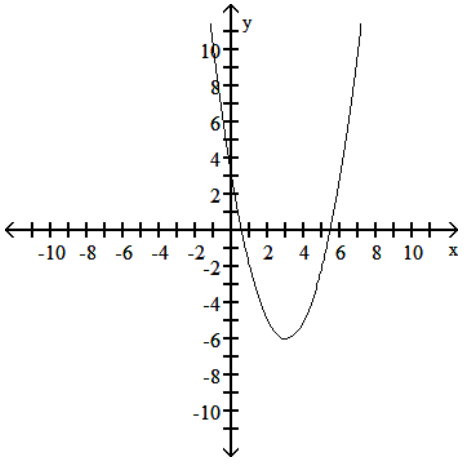
A) Function B) Not a function

Answer: A

Explanation: A)
B)

Give the domain and range of the function.

336) 336) _____



A) Domain $(-\infty, \infty)$; Range $[-6, \infty)$
B) Domain $(-\infty, 0)$; Range $(-\infty, 0)$
C) Domain $(0, \infty)$; Range $[15, \infty)$
D) Domain $(-\infty, 0) \cup (0, \infty)$; Range $(-\infty, 0) \cup (0, \infty)$

Answer: A

Explanation: A)
B)
C)
D)

Classify the function as even, odd, or neither.

337) $f(x) = -4x^3$ 337) _____

A) Even B) Odd C) Neither

Answer: B

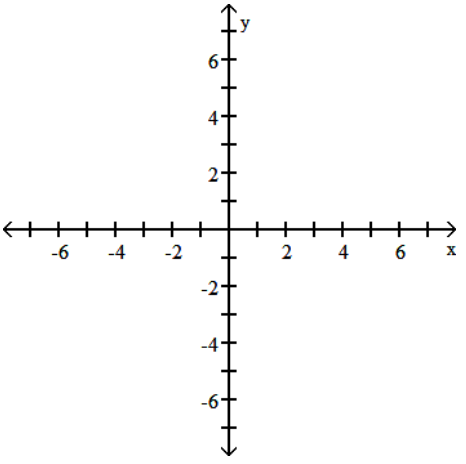
Explanation: A)

B)

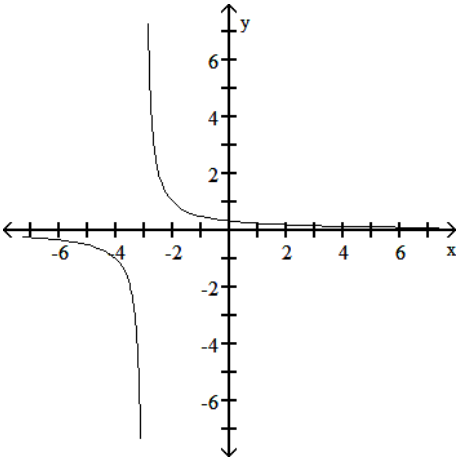
C)

Graph the rational function.

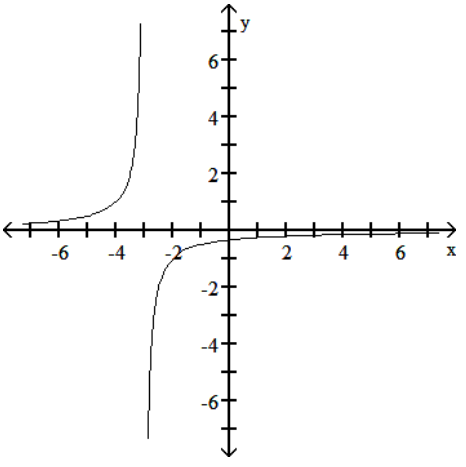
338) $y = \frac{1}{x - 3}$ 338) _____



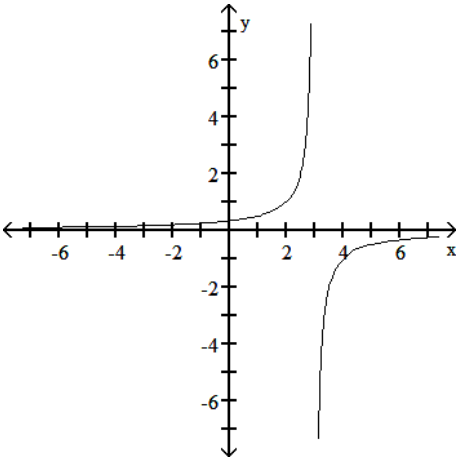
A)



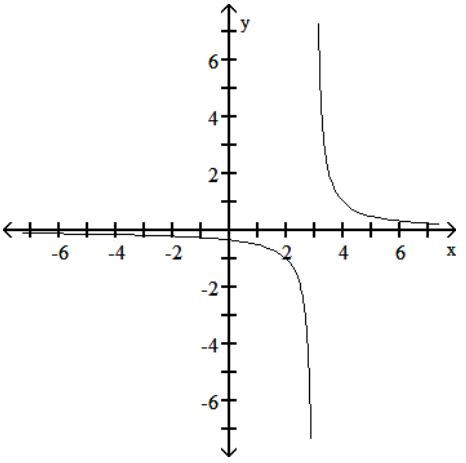
B)



C)



D)



Answer: D

Explanation: A)

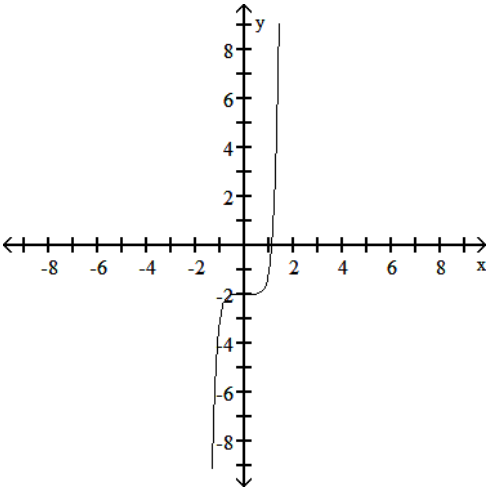
B)

C)

D)

The following is a graph of a polynomial function. State whether the degree of the polynomial is even or odd, and give the sign (+ or -) for the leading coefficient.

339) 339) _____



A) Degree is odd; +

B) Can't identify degree; +

C) Degree is even; -

D) Degree is even; +

Answer: A

Explanation: A)

B)

C)

D)

Solve the problem.

340) Suppose the consumption of electricity grows at 4.5% per year, compounded continuously. Find the number of years before the use of electricity has tripled. Round to the nearest hundredth. 340) _____

A) 66.67 yr B) 0.24 yr C) 24.41 yr D) 2.44 yr

Answer: C

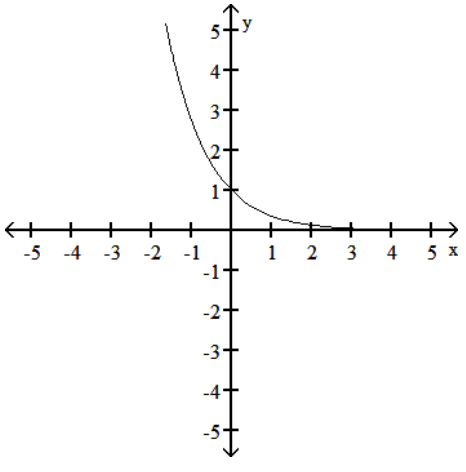
Explanation: A)

B)

C)

D)

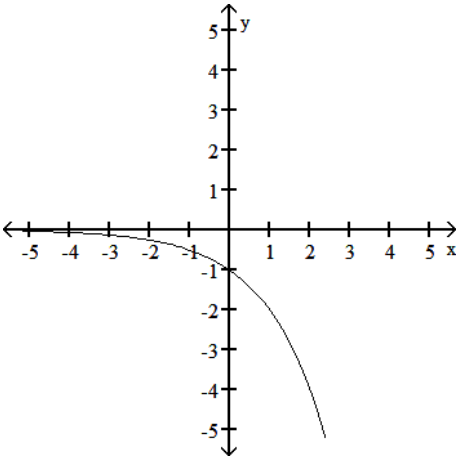
1) C
2) D
3) B
4) D
5) A
6) C
7) B
8) B
9) B
10) A
11) D
12) D
13) B
14) A
15) C
16) B
17) D
18) D
19) B
20) D
21) C
22) D
23) C
24) D
25) B
26) B
27) C
28) A
29) A
30) A
31) B
32) C
33) D
34)



domain: $(-\infty, \infty)$, range: $(0, \infty)$

35) The graph is reflected over the y-axis and then shifted 1 units up.

36)



domain: $(-\infty, \infty)$, range: $(-\infty, 0)$

37) x-intercept is -a ; y-intercept is b

38) This would be a function because at any given time there is only one possible population. Despite the fact that the population can reach the same level several times this is still a function, but for each point in time, there can be no more than one population.

39) The domain is all real numbers and the range is the set of all real numbers. In the context of exam grades, the domain and range both become the set of nonegative real numbers. In this context, times and grades less than zero do not make sense.

40) The graph is shifted 3 units to the right and 2 units up.

41) The classmate's claim is wrong. The horizontal asymptote tells us what the behavior of f(x) will be as x approaches the extremes of its domain, but puts no restrictions on the function in between the extremes.

42) B
43) B
44) A
45) B
46) C
47) B
48) A
49) B
50) A
51) C
52) A
53) C
54) D
55) C
56) A
57) C
58) D
59) D
60) D
61) B
62) C
63) C

64) B
65) B
66) B
67) B
68) D
69) B
70) C
71) B
72) A
73) D
74) C
75) B
76) A
77) A
78) B
79) A
80) D
81) A
82) A
83) C
84) A
85) C
86) C
87) A
88) D
89) A
90) D
91) B
92) D
93) C
94) D
95) C
96) B
97) A
98) D
99) B
100) C
101) C
102) A
103) A
104) C
105) B
106) B
107) C
108) D
109) D
110) B
111) B
112) A
113) B

114) C
115) B
116) D
117) A
118) C
119) C
120) D
121) B
122) C
123) B
124) D
125) B
126) C
127) D
128) C
129) D
130) D
131) D
132) B
133) D
134) A
135) A
136) C
137) B
138) A
139) D
140) B
141) A
142) B
143) B
144) A
145) B
146) A
147) C
148) B
149) A
150) C
151) A
152) A
153) B
154) D
155) D
156) A
157) B
158) D
159) B
160) D
161) D
162) D
163) C

164) C
165) D
166) C
167) D
168) D
169) C
170) A
171) A
172) A
173) B
174) D
175) B
176) B
177) B
178) C
179) B
180) A
181) C
182) A
183) B
184) B
185) D
186) C
187) C
188) C
189) D
190) B
191) A
192) C
193) D
194) B
195) D
196) D
197) A
198) B
199) B
200) A
201) C
202) A
203) B
204) A
205) C
206) A
207) A
208) B
209) D
210) A
211) B
212) A
213) C

214) C
215) B
216) D
217) A
218) D
219) C
220) A
221) A
222) D
223) D
224) D
225) D
226) A
227) D
228) C
229) A
230) C
231) C
232) C
233) A
234) B
235) A
236) A
237) D
238) D
239) D
240) B
241) A
242) A
243) D
244) A
245) C
246) C
247) B
248) A
249) B
250) A
251) C
252) B
253) A
254) B
255) C
256) A
257) B
258) C
259) C
260) B
261) D
262) D
263) D

264) D
265) B
266) B
267) A
268) D
269) B
270) C
271) D
272) D
273) A
274) D
275) C
276) A
277) B
278) A
279) C
280) C
281) D
282) B
283) D
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287) D
288) B
289) B
290) B
291) C
292) C
293) C
294) C
295) B
296) B
297) C
298) B
299) C
300) B
301) A
302) B
303) D
304) C
305) C
306) D
307) D
308) D
309) B
310) A
311) B
312) D
313) A

314) D
315) A
316) A
317) C
318) B
319) B
320) C
321) D
322) D
323) C
324) C
325) A
326) B
327) B
328) A
329) A
330) A
331) C
332) A
333) A
334) D
335) A
336) A
337) B
338) D
339) A
340) C