

**Student:** \_\_\_\_\_  
**Date:** \_\_\_\_\_

**Instructor:** Alfredo Alvarez  
**Course:** Math 1324

**Assignment:** math1324homework115

1. The given table gives  $y$  as a function of  $x$ , with  $y = f(x)$ . Use the table given to the right to find  $y = f(-6)$  and  $y = f(21)$ .

$x$	-8	-4	-6	3	10	16	21
$y = f(x)$	4	5	7	3	9	9	12

$$y = f(-6) = \boxed{\phantom{000}}$$

$$y = f(21) = \boxed{\phantom{000}}$$

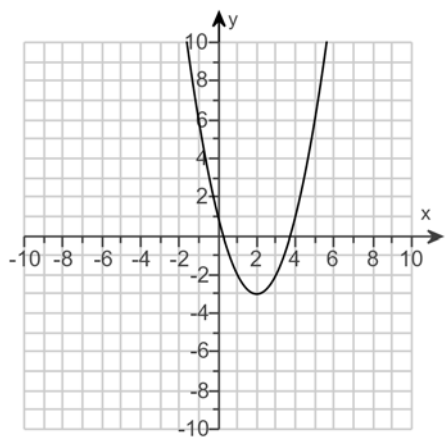
2. For each of the functions  $y = f(x)$  described below, find  $f(0)$ .

(a)

$x$	-1	0	1	2	3
$f(x)$	4	6	4	-6	-5

(b)  $y = 12 - 2x^2$

(c)

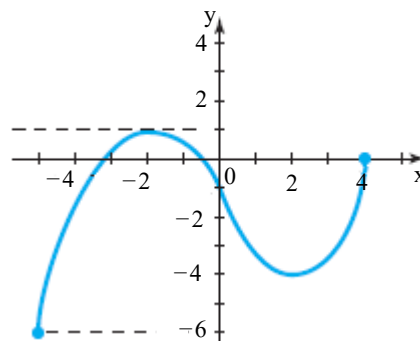


(a)  $f(0) = \boxed{\phantom{000}}$

(b)  $f(0) = \boxed{\phantom{000}}$

(c)  $f(0) = \boxed{\phantom{000}}$

3. Find the domain and range for the function shown in the graph given below.



What is the domain?

$\boxed{\phantom{000}}$  (Type your answer in interval notation.)

What is the range?

$\boxed{\phantom{000}}$  (Type your answer in interval notation.)

4. Find the domain of the function  $y = \sqrt{2x - 14}$ .

The domain of the function  $y = \sqrt{2x - 14}$  is  $\boxed{\phantom{000}}$ .  
 (Type your answer in interval notation.)

5. A couple wants to buy a \$33,000 car and can borrow the money for the purchase at 5%, paying it off in 3, 4, or 5 years. The table to the right gives the monthly payment and total cost of the purchase (including the loan) for each of the payment plans. Suppose that when the payment is over  $t$  years,  $P(t)$  represents the monthly payment and  $C(t)$  represents the total cost for the car loan. Use this information to answer parts (a) through (d).

$t$ (years)	Monthly Payment \$	Total Cost \$
3	989.04	35,605.44
4	759.97	36,478.56
5	622.76	37,365.60

a. Find  $P(5)$  and write a sentence that explains its meaning. Select the correct choice below and fill in the answer box to complete your choice.

☐ A. If the car is financed over 5 years, the payment is  $P(5) =$  \_\_\_\_\_ dollars.

☐ B. If the car is financed over 5 years, the total cost is  $P(5) =$  \_\_\_\_\_ dollars.

b. What is the total cost of the purchase if it is financed over 4 years? Write the answer using function notation. Select the correct choice below and fill in the answer box to complete your choice.

☐ A.  $C(4) =$  \_\_\_\_\_

☐ B.  $P(4) =$  \_\_\_\_\_

c. What is  $t$  if  $C(t) = 37,365.60$ ?

$t =$

d. How much will the couple save if they finance the car for 3 years rather than 4 years?

\$

6. Complete the table of values for the following function and then plot the points to graph the function by hand.

$$f(x) = 3x - 3$$

Select the correct choice below and fill in any answer boxes within your choice.

☐ A.

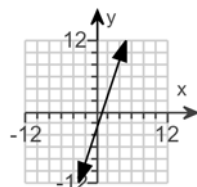
$x$	-2	-1	0
$f(x)$	<input type="text"/>	<input type="text"/>	<input type="text"/>

(Type integers or simplified fractions.)

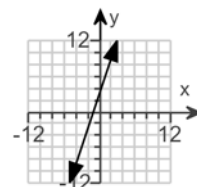
☐ B. The function is undefined.

Choose the correct graph on the right.

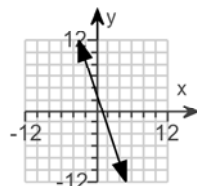
☐ A.



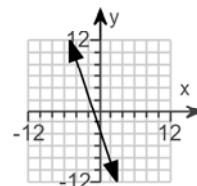
☐ B.



☐ C.



☐ D.

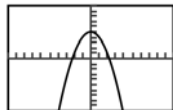


7. Graph the function with a graphing calculator using a standard viewing window. State whether the graph has a turning point in this window.

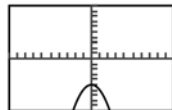
$$y = x^2 - 5$$

Choose the correct graph below.

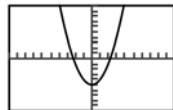
☐ A.



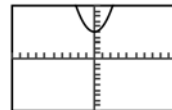
☐ B.



☐ C.



☐ D.



State whether the graph has a turning point in this window. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The graph has a turning point in this window. The turning point(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ B. There is no turning point.

8. Find an appropriate viewing window for the function, using the given x-values. Then graph the function.

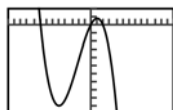
$$y = x^3 + 6x^2 - 15x, \text{ for } x\text{-values between } -13 \text{ and } 13.$$

Which of the following is the viewing window for the function, using the given x-values?

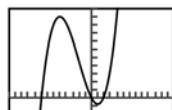
- ☐ A.  $[-13, 13]$  by  $[0, 110]$
- ☐ B.  $[-13, 13]$  by  $[-20, 110]$
- ☐ C.  $[-13, 13]$  by  $[-20, 0]$
- ☐ D.  $[-13, 13]$  by  $[-10, 10]$

Which of the following is the graph of  $y = x^3 + 6x^2 - 15x$  with the above viewing window?

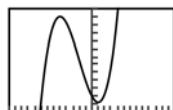
☐ A.



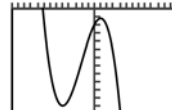
☐ B.



☐ C.



☐ D.

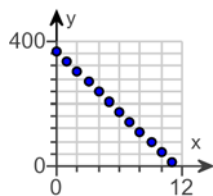


State whether the graph has a turning point in this window. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

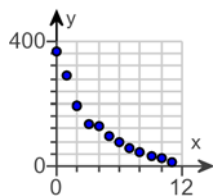
- ☐ A. The graph has a turning point in this window. The turning point(s) is/are \_\_\_\_\_.  
(Type an ordered pair. Use a comma to separate answers as needed.)
- ☐ B. There is no turning point.

9. Enter the data into lists and graph the scatter plot of the data.

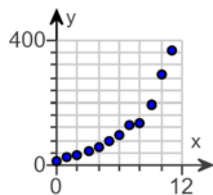
☐ A.



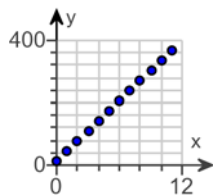
☐ B.



☐ C.



☐ D.



x	y
0	13
1	24
2	35
3	47
4	59
5	75
6	95
7	128
8	134
9	196
10	288
11	366

10. Suppose  $f(x) = x^2 - 6x$  million dollars are earned, where  $x$  is the number of years after 1990.

a. What is  $f(30)$ ?

b. The answer to part (a) gives the number of millions of dollars earned for what year?

a. What is  $f(30)$ ?

$f(30) =$

b. The answer to part (a) gives the number of millions of dollars earned for what year?

11. Find the slope, if it exists, of the line containing the pair of points.

$(-15, -4)$  and  $(-19, -6)$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The slope is \_\_\_\_\_. (Type an integer or a simplified fraction.)

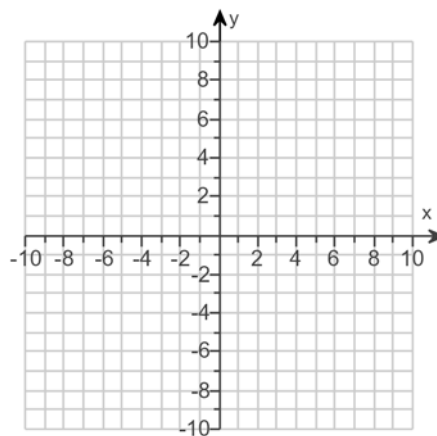
☐ B. The slope is undefined.

12.

Use the intercepts to graph the equation.

$$2x + 3y = 6$$

Use the graphing tool to graph the line. Use the intercepts when drawing the line. If only one intercept exists, use it and another point to draw the line.



13.

Give the slope and the y-intercept of the line with the given equation. Then, graph the linear equation.

$$y = 3x + 7$$

What is the slope? Select the correct choice below and fill in any answer boxes within your choice.

☐ A. The slope is \_\_\_\_\_.  
(Simplify your answer.)

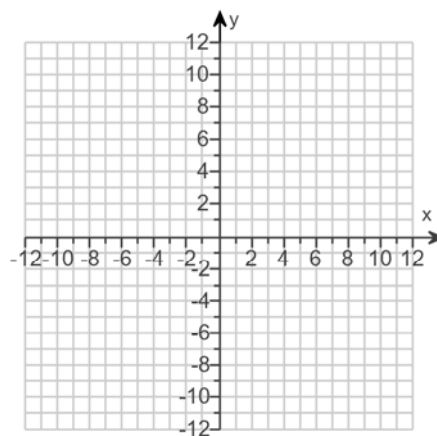
☐ B. The slope is undefined.

What is the y-intercept? Select the correct choice below and fill in any answer boxes within your choice.

☐ A. The y-intercept is \_\_\_\_\_.  
(Type an integer or a simplified fraction.)

☐ B. There is no y-intercept.

Graph the equation.



14. Find the rate of change.

$$y = 6x - 5$$

The rate of change is .  
(Simplify your answer.)

15. If a linear function has the points  $(-6, -8)$  and  $(7, 9)$  on its graph, what is the rate of change of the function?

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The rate of change is \_\_\_\_\_. (Type an integer or a simplified fraction.)

☐ B. There is no solution.

16.

Write the equation of the line passing through the point  $(7, -7)$  with slope  $-\frac{6}{7}$ .

The equation of the line is  $y =$  .

(Type an expression using  $x$  as the variable. Use integers or fractions for any numbers in the expression.)

17. For the function  $y = x^2$ , compute the average rate of change between  $x = -5$  and  $x = -2$ .

The average rate of change is .

(Simplify your answer.)

18. For the given function, find  $\frac{f(x+h) - f(x)}{h}$ .

$$f(x) = 2x^2 + 5$$

$$\frac{f(x+h) - f(x)}{h} = \text{} \quad (\text{Simplify your answer.})$$

19. The following table gives the number of drinks and the resulting blood alcohol percent for a man of a certain weight legally considered driving under the influence (DUI).
- The average rate of change in blood alcohol percent with respect to the number of drinks is a constant. What is it?
  - Use the rate of change and one point determined by a number of drinks and the resulting blood alcohol percent to write an equation of a linear model for this data.

Number of Drinks	5	6	7	8	9	10
Blood Alcohol Percent	0.14	0.16	0.18	0.20	0.22	0.24

- a. What is the rate of change in blood alcohol percent?

%

- b. What is the equation that models blood alcohol percent as a function of  $x$ , where  $x$  is the number of drinks?

$y = \text{$

(Type an expression using  $x$  as the variable. Type your answer in slope-intercept form. Simplify your answer.)

20. The table below gives the blood alcohol percent for females of a certain weight.

- The rate of change in blood alcohol percent is a constant. What is it?
- Write the equation of the function that models the blood alcohol percent as a function of the number of drinks.

Number of Drinks	0	1	2	3	4	5	6	7	8	9
Blood Alcohol Percent	0	0.07	0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.63

- a. What is the rate of change in blood alcohol percent?

%

- b. What is the equation that models blood alcohol percent as a function of  $x$ , where  $x$  is the number of drinks?

$f(x) = \text{$

(Type an expression using  $x$  as the variable.)

21. Solve the equation.

$$5x - 9 = 15 + 11x$$

$x = \text{$

(Simplify your answer.)

22. Solve the equation.

$$5(x - 7) = -3x - 27$$

x =

23. Solve the following inequality.

$$3x + 2 > -2$$

x(1)   (Simplify your answer. Type an integer or a simplified fraction.)

(1) ☐ >  
☐ <

24. Solve the following inequality.

$$-4(x - 3) < -3$$

x(1)   (Simplify your answer. Type an integer or a fraction.)

(1) ☐ >  
☐ <

25. Solve the equation.

$$5.49t = 1.88t - 3.61$$

The solution is t = .  
(Simplify your answer.)

26. Find (a) the solution to the equation  $f(x) = 0$ , (b) the x-intercept of the graph of  $y = f(x)$ , and (c) the zero of  $f(x)$ .

$$f(x) = 66 + 3.3x$$

(a) What is the solution to  $f(x) = 0$ ?

x =  (Simplify your answer.)

(b) What is the x-intercept?

x =  (Simplify your answer.)

(c) What is the zero of  $f(x)$ ?

(Simplify your answer.)

27. Solve the following formula for t.

$$D = B(1 + rt)$$

The solution is t = . (Simplify your answer.)

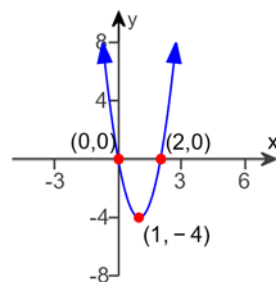
28. Solve the following equation for  $n$ .

$$\frac{P}{2} + A = 9m - 2n$$

$n =$

(Use integers or fractions for any numbers in the expression. Do not factor. Simplify your answer.)

29. Write the equation of the quadratic function whose graph is shown to the right.



Choose the correct answer below.

- ☐ A.  $y = 4(x - 4)^2 - 1$
- ☐ B.  $y = -4(x - 1)^2 - 4$
- ☐ C.  $y = 4(x + 1)^2 - 4$
- ☐ D.  $y = 4(x - 1)^2 - 4$

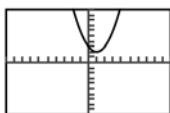
30. Consider the function  $f(x) = 2(x - 1)^2 - 2$ .

- (a) Give the coordinates of the vertex of the graph of the function.
- (b) Graph the function on a window that includes the vertex.

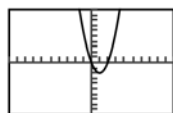
(a) The vertex of the function is . (Type an ordered pair.)

(b) Choose the correct graph below.

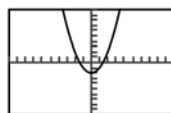
☐ A.



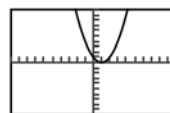
☐ B.



☐ C.



☐ D.



$[-10, 10]$  by  $[-10, 10]$ ,  $X_{\text{scl}} = 1$ ,  $Y_{\text{scl}} = 1$



31. Consider the function  $y = 3x^2 + 12x - 23$ .

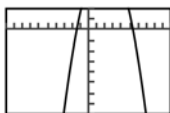
(a) Give the coordinates of the vertex of the graph of the function.

(b) Graph the function on a window that includes the vertex.

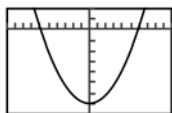
(a) The vertex of the graph of the function is at the point . (Type an ordered pair.)

(b) Choose the correct graph below. Each graph shown below has a window of  $[-10, 10]$  by  $[-40, 10]$ .

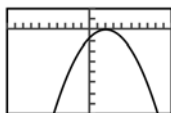
☐ A.



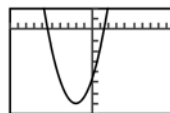
☐ B.



☐ C.



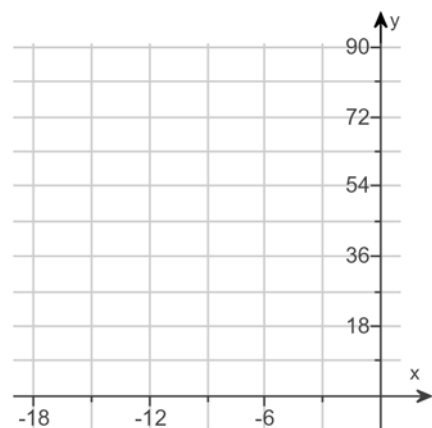
☐ D.



32. Draw the graph of the function.

$$y = x^2 + 18x + 81$$

Use the graphing tool to graph the equation.

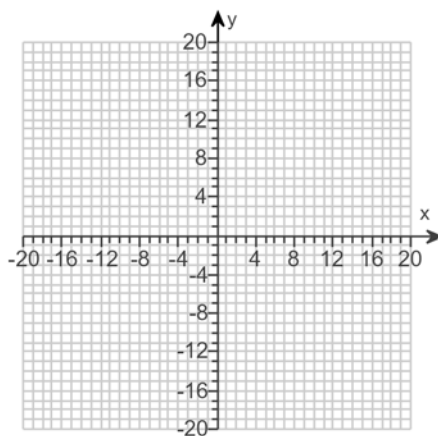


33. Use the graph of the following function to estimate the x-intercepts.

$$y = 2x^2 - 12x + 16$$

Use the graphing tool to graph the function.

The x-intercept(s) of the graph is/are .  
(Use a comma to separate answers as needed.)



34. If 2800 feet of fence are used to enclose a rectangular pen, the resulting area of the pen is  $A = x(1400 - x)$ , where  $x$  is the width of the pen. Is  $A$  a quadratic function? What is the maximum area of the pen?

 $(1400 - x)$ 

Is  $A$  a quadratic function?

- ☐ No  
☐ Yes

The maximum possible area of the pen is  sq ft.  
 (Simplify your answer.)

35. Use factoring to solve the equation.

$$s^2 - 7s - 8 = 0$$

The solution is  $s =$  .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

36. Use factoring to solve the equation.

$$w^2 - 11w + 24 = 0$$

The solution is  $w =$  .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

37. Solve the equation.

$$4x^2 - 28x - 32 = 0$$

$x =$

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

38. Solve the equation for  $v$ .

$$5v^2 + 39v + 54 = 0$$

$v =$

(Simplify your answers. Use a comma to separate answers as needed.)

39. Use factoring to solve the equation

$$4x^2 + 31x = -42$$

The solution is  $x =$  .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

40. Use a graphing utility to find the  $x$ -intercepts of the graph of the function.

$$y = x^2 - 6x - 27$$

Select the correct choice below and fill in any answer boxes within your choice.

- ☐ **A.** The  $x$ -intercept(s) is/are  $x =$  .  
 (Simplify your answer. Use a comma to separate answers as needed.)  
☐ **B.** There is no  $x$ -intercept.

41.

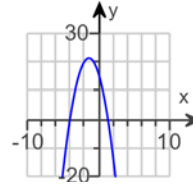
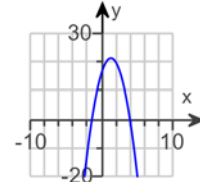
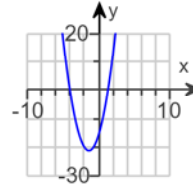
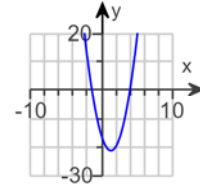
Use a graphing utility as an aid in factoring to solve the equation.

$$3x^2 + 8x - 16 = 0$$

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

- ☐ A. The solution(s) is/are \_\_\_\_\_.  
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. The equation has no solution.

Choose the correct graph of the equation.

☐ A.☐ B.☐ C.☐ D.

42. Complete the square to solve the quadratic equation.

$$x^2 - 13x + 30 = 0$$

$$x = \boxed{\phantom{000}}$$

(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

43.

Use the quadratic formula to solve the equation.

$$x^2 + 3x - 5 = 0$$

$$x = \boxed{\phantom{000}}$$

(Simplify your answer. Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

44.

Use the quadratic formula to solve the equation.

$$7p + 3p^2 = -2$$

$$p = \boxed{\phantom{000}}$$

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

45. Use a graphing utility to find or approximate solution(s) of the given equation.

$$6x^2 + 6x - 36 = 0$$

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

- ☐ A. The solution(s) is/are  $x =$  \_\_\_\_\_.  
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- ☐ B. The equation has no solution.

46. Find the exact solutions to  $f(x) = 0$  in the complex numbers and confirm that the solutions are not real by showing that the graph of  $y = f(x)$  does not cross the  $x$ -axis.

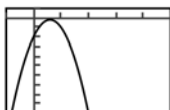
$$x^2 + 12x + 40 = 0$$

The solution(s) is/are  $x =$  .

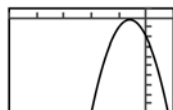
(Simplify your answer. Type your answer in the form  $a + bi$ . Type an exact answer, using radicals as needed. Use a comma to separate answers as needed.)

Choose the correct graph of the function  $y = x^2 + 12x + 40$ .

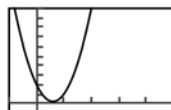
☐ A.



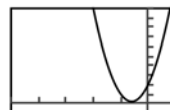
☐ B.



☐ C.



☐ D.



47. If a ball is thrown upward at 64 feet per second from a height of 8 feet, the height of the ball can be modeled by  $S = 8 + 64t - 16t^2$ , where  $t$  is the number of seconds after the ball is thrown. How long after the ball is thrown is the height 68 feet?

It takes  seconds for the ball to reach the height 68 feet.

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

48.

The total revenue function for a product is given by  $R = 755x$  dollars, and the total cost function for this same product is given by  $C = 22,750 + 70x + x^2$ , where  $C$  is measured in dollars. For both functions, the input  $x$  is the number of units produced and sold.

- Form the profit function for this product from the two given functions.
- What is the profit when 27 units are produced and sold?
- What is the profit when 41 units are produced and sold?
- How many units must be sold to break even on this product?

a. Write the profit function.

$P(x) =$

(Simplify your answer.)

b. When 27 units are produced and sold, there is a

(1)  of \$ .

(Simplify your answer.)

c. When 41 units are produced and sold, there is a

(2)  of \$ .

(Simplify your answer.)

d. The number of units that must be sold to break even on this product is .

(Simplify your answer. Use a comma to separate answers as needed.)

(1) ☐ loss

☐ profit

(2) ☐ loss

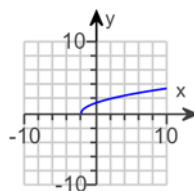
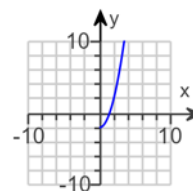
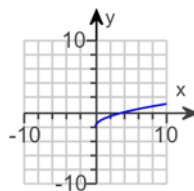
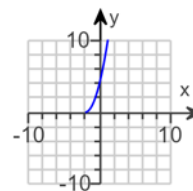
☐ profit

49.

Sketch the graph of the function.

$$y = \sqrt{x} - 2$$

Choose the correct graph of the function.

☐ A.☐ B.☐ C.☐ D.

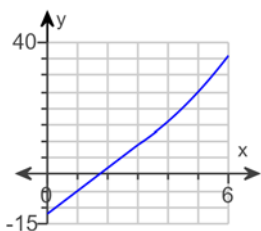
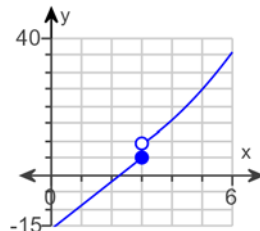
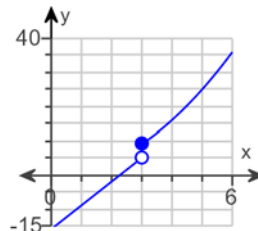
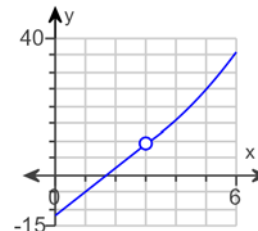
50.

a. Graph  $f(x) = \begin{cases} 7x - 12 & \text{if } x \leq 3 \\ x^2 & \text{if } x > 3 \end{cases}$

b. Find  $f(2)$  and  $f(4)$ .

c. State the domain of the function.

a. Choose the correct graph below.

☐ A.☐ B.☐ C.☐ D.

b.  $f(2) =$   and  $f(4) =$

c. Choose the correct answer below.

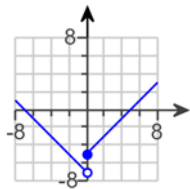
- ☐ A. The domain of the function is  $x > 3$ .
- ☐ B. The domain of the function is  $x \leq 3$ .
- ☐ C. The domain of the function is  $x < 3$  and  $x > 3$ .
- ☐ D. The domain of the function is all real numbers.

51. Graph the piecewise linear function.

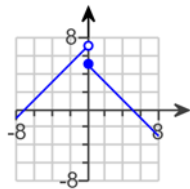
$$f(x) = \begin{cases} -x + 5 & \text{for } x \geq 0 \\ x + 7 & \text{for } x < 0 \end{cases}$$

Choose the correct graph.

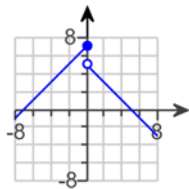
☐ A.



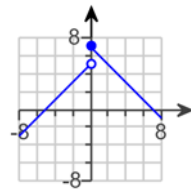
☐ B.



☐ C.



☐ D.



52. Solve the following equation.

$$|x - 5| = 5$$

Select the correct choice below and fill in any answer boxes in your choice.

☐ A.

The solution(s) is/are  $x =$  \_\_\_\_\_.

(Simplify your answer. Use a comma to separate answers as needed.)

☐ B.

There is no solution.

53. A proposed income tax schedule is shown in the table below.

if your income is: over	but not over	your tax is	of the amount over
\$0	\$45,460	----- 18%	\$0
45,460	111,560	\$8,182.80 + 28%	45,460
111,560	177,520	20,080.80 + 36%	111,560
177,520	224,220	31,953.60 + 39%	177,520
224,220	-----	63,907.20 + 44.3%	224,220

- (a) Write the piecewise-defined function  $T$  with input  $x$  that models the tax dollars owed as a function of  $x$ , the income, with 0

$$T(x) = \begin{cases} \boxed{\phantom{000000}} & \text{if } 0 < x \leq 45,460 \\ \boxed{\phantom{000000}} & \text{if } 45,460 < x \leq 111,560 \end{cases}$$

(Simplify your answer. Use integers or decimals for any numbers in the expression. Do not include the \$ symbol in your answer.)

- (b) Use the function to find  $T(36,000)$ .

$$T(36,000) = \$ \boxed{\phantom{000000}} \text{ (Type an integer or a decimal.)}$$

- (c) Find the tax owed on an income of \$63,000.

$$T(63,000) = \$ \boxed{\phantom{000000}} \text{ (Type an integer or a decimal.)}$$

- (d) A friend tells you not to earn any money over \$45,460 because it would raise your tax rate to 28% on all of your income. Test this statement by finding the tax on \$45,460 and on \$45,460 + \$1.

$$T(45,460) = \$ \boxed{\phantom{000000}} \text{ (Type an integer or a decimal.)}$$

$$T(45,460 + 1) = \$ \boxed{\phantom{000000}} \text{ (Type an integer or a decimal.)}$$

Does earning more than \$45,460 raise your income tax rate to 28% on all of your income?

☐ Yes

☐ No

- 54.

Consider the functions  $y = |x|$  and  $y = |x - 4| - 6$ .

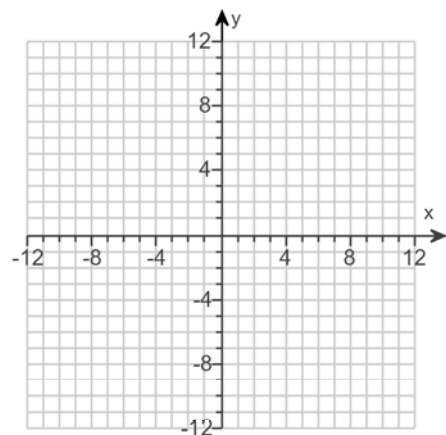
- (a) Sketch the graph of the pair of functions using a standard window.

- (b) Describe the transformations used to obtain the graph of the second function from the first function.

- (a) Graph both functions on the same coordinate grid.

- (b) Which transformations are used to obtain the graph of the second function from the first function?

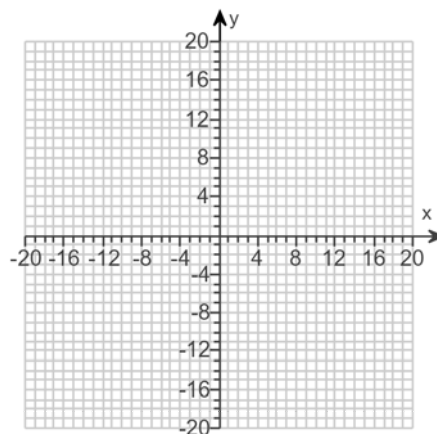
- ☐ A. Vertical shift 6 units up and horizontal shift 4 units right
- ☐ B. Vertical shift 6 units up and horizontal shift 4 units left
- ☐ C. Vertical shift 6 units down and horizontal shift 4 units left
- ☐ D. Vertical shift 6 units down and horizontal shift 4 units right



55.

Consider the functions  $y = x^2$  and  $y = -x^2 + 1$ .

- (a) Sketch the graph of the pair of functions using a standard window.  
 (b) Describe the transformation used to obtain the graph of the second function from the first function.



(a) Use the graphing tool to graph the functions.

(b) Choose the correct transformation below.

- ☐ A. reflection across the x-axis and vertical shift 1 unit up  
☐ B. reflection across the y-axis and horizontal shift 1 unit to the left  
☐ C. reflection across the y-axis and horizontal shift 1 unit to the right  
☐ D. reflection across the x-axis and vertical shift 1 unit down

56.

Determine the symmetries (if any) of the graph of the given relation.

$$y = 2x^3$$

Choose the correct symmetry of the graph.

- ☐ A. It is symmetric with respect to the origin.  
☐ B. It is symmetric with respect to the x-axis.  
☐ C. It is symmetric with respect to the y-axis.  
☐ D. It has no symmetries.

57. Determine algebraically whether the graph of the given equation is symmetric with respect to the x-axis, the y-axis, and/or, the origin. Confirm graphically.

$$y = \frac{2}{x}$$

Select all that apply.

- ☐ A. The graph is symmetric with respect to the origin.  
☐ B. The graph is symmetric with respect to the y-axis.  
☐ C. The graph is symmetric with respect to the x-axis.  
☐ D. None of these



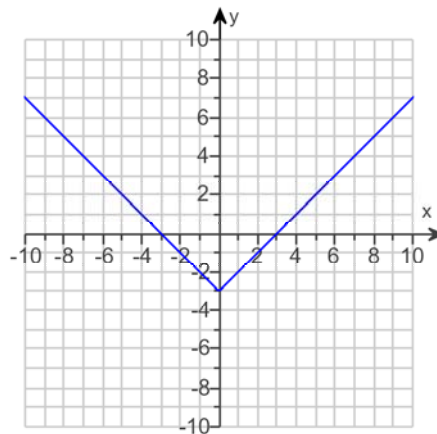
58.

Determine whether the function is even, odd, or neither.

$$f(x) = |x| - 3$$

Is the function even, odd, or neither?

- ☐ A. Even  
☐ B. Neither  
☐ C. Odd



59.

Let  $f(x) = 4x^2 + 4$  and  $g(x) = 5x - 2$ . Find  $(f + g)(x)$ ,  $(f - g)(x)$ ,  $(f \cdot g)(x)$ , and  $\left(\frac{f}{g}\right)(x)$ . Determine the domain of  $\left(\frac{f}{g}\right)(x)$ .

$$(f + g)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer. Do not factor.)}$$

$$(f - g)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer. Do not factor.)}$$

$$(f \cdot g)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer. Do not factor.)}$$

$$\left(\frac{f}{g}\right)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer. Do not factor.)}$$

Choose the correct domain of  $\frac{f}{g}$ .

- ☐ A. All real numbers except  $\pm 1$   
☐ B. All real numbers except 0  
☐ C. All real numbers except  $\frac{2}{5}$   
☐ D. All real numbers

60.

If  $f(x) = x^2 - 6x$  and  $g(x) = 8 - x^3$ , evaluate the following.

a.  $(f + g)(-1)$     b.  $(g - f)(4)$     c.  $(f \cdot g)(1)$     d.  $\left(\frac{g}{f}\right)(4)$

a.  $(f + g)(-1) = \boxed{\phantom{000000}}$  (Simplify your answer.)

b.  $(g - f)(4) = \boxed{\phantom{000000}}$  (Simplify your answer.)

c.  $(f \cdot g)(1) = \boxed{\phantom{000000}}$  (Simplify your answer.)

d.  $\left(\frac{g}{f}\right)(4) = \boxed{\phantom{000000}}$  (Type an integer or a simplified fraction.)

61. Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ .

$$f(x) = 8x - 8, \quad g(x) = 8 - 3x$$

$$(f \circ g)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer.)}$$

$$(g \circ f)(x) = \boxed{\phantom{000000}} \text{ (Simplify your answer.)}$$

62. Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$  for the indicated functions.

$$f(x) = 7x - 7, \quad g(x) = \frac{x + 7}{7}$$

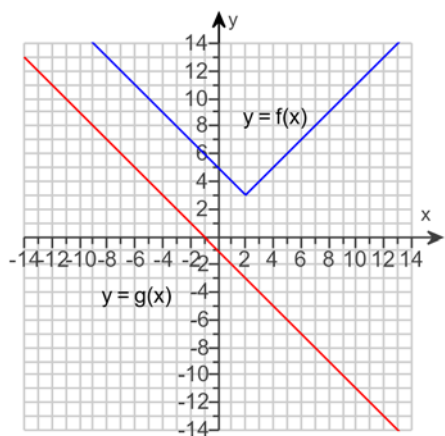
$$(f \circ g)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

$$(g \circ f)(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

63. Use the graph of  $f$  and  $g$  to evaluate the functions.

a.  $(f + g)(8)$       b.  $(f \circ g)(-5)$

c.  $\left(\frac{f}{g}\right)(4)$       d.  $(g \circ f)(-2)$



a.  $(f + g)(8) = \boxed{\phantom{000}}$   
(Simplify your answer.)

b.  $(f \circ g)(-5) = \boxed{\phantom{000}}$   
(Simplify your answer.)

c.  $\left(\frac{f}{g}\right)(4) = \boxed{\phantom{000}}$   
(Simplify your answer.)

d.  $(g \circ f)(-2) = \boxed{\phantom{000}}$   
(Simplify your answer.)

64. For the following function, determine whether the function is one-to-one.

$$\{(2, 6), (5, 6), (-9, 3), (1, -8)\}$$

Is the function one-to-one?

- ☐ Yes  
☐ No

65.

Determine whether the function is one-to-one. If it is, find a formula for its inverse.

$$f(x) = 5x - 6$$

Is the function one-to-one?

- ☐ No  
☐ Yes

Find a formula for the inverse if it exists. Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $f^{-1}(x) =$  \_\_\_\_\_  
 (Simplify your answer.)  
☐ B. There is no inverse function.

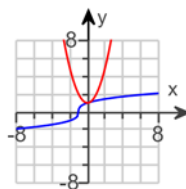
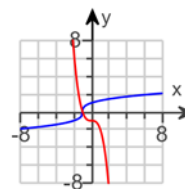
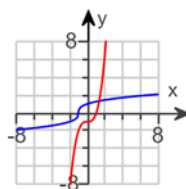
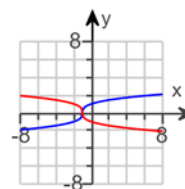
66. Find the inverse of  $g(x) = 6x + 4$ .

$$g^{-1}(x) = \boxed{\phantom{000}} \text{ (Simplify your answer.)}$$

67.

Graph  $g(x) = \sqrt[3]{x+1}$  and its inverse  $g^{-1}(x)$  on the same axes.

Choose the correct graph on the right. The graph of  $g(x)$  is shown in blue and the graph of  $g^{-1}(x)$  is shown in red.

☐ A.☐ B.☐ C.☐ D.

68. If we assign numbers to the letters of the alphabet as follows and assign 27 to a blank space, we can convert a message to a numerical sequence. We can "encode" a message by adding 2 to each number that represents a letter in a message. Thus, the message "GO FOR IT" can be encoded by using the numbers to represent the letters and further encoded by using the function  $C(x) = x + 2$ . The coded message would be 9 17 29 8 17 20 29 11 22.

A	B	C	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26

Find the inverse of the function.

$$C^{-1}(x) = \boxed{\phantom{000}}$$

Use  $C^{-1}(x)$  to decode 21 10 7 29 25 7 16 22 29 22 10 7 20 7.

The decoded message is .

69. Use algebraic methods to solve the inequality.

$$-x^2 + 7x + 8 > 0$$

The solution is .

(Simplify your answer. Type an inequality or a compound inequality.)

70. Use algebraic methods to solve the following inequality.

$$2x^2 - 2x \geq 84$$

Choose the correct answer below.

- ☐ A.  $-6 \leq x \leq 7$   
☐ B.  $-2 \leq x \leq 2$   
☐ C.  $x \leq -2$  or  $x \geq 2$   
☐ D. No solution  
☐ E.  $x \leq -6$  or  $x \geq 7$

71. Use algebraic methods to solve the inequality.

$$x^2 - 2x < 8$$

The solution is .

(Simplify your answer. Type an inequality or a compound inequality.)

72. Solve for  $x$ .

$$|5x - 4| \leq 9$$

What is the solution? Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A.  $x \leq$  \_\_\_\_\_ or  $x \geq$  \_\_\_\_\_  
(Simplify your answers.)
- ☐ B. \_\_\_\_\_  $\leq x \leq$  \_\_\_\_\_  
(Simplify your answers.)

73. Solve the following inequality.

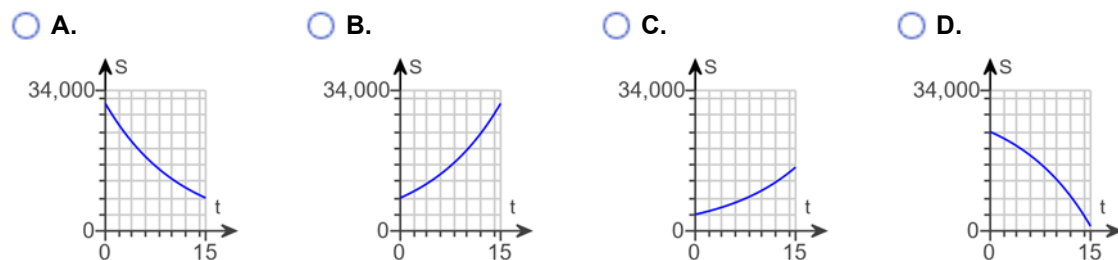
$$|x - 5| > 6$$

The solution is .

(Simplify your answer. Type an inequality or a double inequality. Use a comma to separate answers as needed.)

74. If \$8000 is invested for  $t$  years at 9% interest compounded continuously, the future value is given by  $S = 8000 e^{0.09t}$  dollars. Complete parts (a) through (c).

(a) Graph this function for  $0 \leq t \leq 15$ . Choose the correct graph below.



(b) Use the graph to estimate when the future value will be \$24,000. Choose the correct answer below.

- ☐ A.  $t \approx 13.21$  years ☐ B.  $t \approx 24.42$  years ☐ C.  $t \approx 12.21$  years ☐ D.  $t \approx 11.21$  years

(c) Complete the following table.

$t$ (Year)	$S$ (\$)
<input type="text"/>	28,203.37

(Round to the nearest whole number as needed.)

Complete the following table.

$t$ (Year)	$S$ (\$)
10	<input type="text"/>
15	<input type="text"/>

(Type an integer or decimal rounded to two decimal places as needed.)

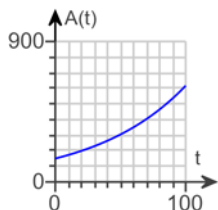
75. The amount of a radioactive isotope present at time  $t$  is given by  $A(t) = 300e^{-0.02827t}$  grams, where  $t$  is the time in years that the isotope decays. The initial amount present is 300 grams. Complete parts (a) through (c).

(a) How many grams remain after 35 years?

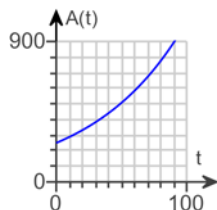
g (Type an integer or decimal rounded to two decimal places as needed.)

(b) Graph this function for  $0 \leq t \leq 100$ . Choose the correct graph below.

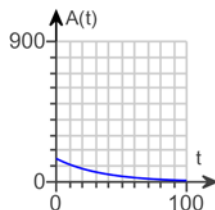
☐ A.



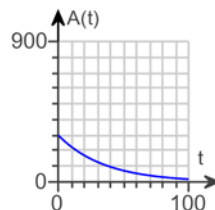
☐ B.



☐ C.



☐ D.



(c) If the half-life is the time it takes for half of the initial amount to decay, use graphical methods to estimate the half-life of this isotope. Choose the correct answer below.

☐ A. about 44.52 years

☐ B. about 9.52 years

☐ C. about 24.52 years

☐ D. about 49.04 years

76. Use the definition of a logarithmic function to write the logarithmic equation as an equation involving an exponent.

$$\log_2 A = B$$

The equivalent exponential equation is .

(Type an equation. Do not simplify.)

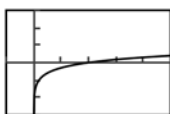
77. Write the exponential equation  $x = 8^y$  in logarithmic form.

The equivalent logarithmic equation is .

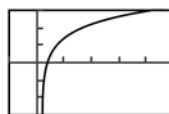
78. Graph  $f(x) = \log(x - 1)$ .

Choose the correct graph.

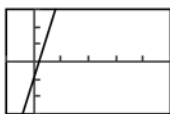
☐ A.



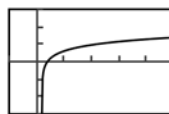
☐ B.



☐ C.



☐ D.



For all graphs:  $[-5, 25, -3, 3]$ ; Xscl = 5, Yscl = 1

79. Rewrite the expression  $\log_2 \frac{\sqrt[6]{5x+1}}{5x^2}$  as a sum, difference, or product of logarithms, and simplify if possible.

Choose the correct answer below.

- ☐  $\log_2 \frac{\sqrt[6]{5x+1}}{5x^2} = \frac{1}{6} \log_2(5x+1)$
- ☐  $\log_2 \frac{\sqrt[6]{5x+1}}{5x^2} = \frac{1}{6} \log_2(5x+1) - 2 \log_2(x) - \log_2 5$
- ☐  $\log_2 \frac{\sqrt[6]{5x+1}}{5x^2} = 6 \log_2(5x+1) - 2 \log_2(x) - \log_2 5$
- ☐ The expression cannot be simplified.

80. Write as a single logarithm. Assume that variables represent positive numbers.

$$5 \log_4 x + 9 \log_4 z$$

$$5 \log_4 x + 9 \log_4 z = \boxed{\phantom{000}}$$

81. Solve the following equation algebraically and check graphically.

$$8947 = e^{4x}$$

$$x \approx \boxed{\phantom{000}}$$

(Do not round until the final answer. Then round to three decimal places as needed.)

82. Solve the following exponential equation.

$$5e^{9x} = 1915$$

$$x \approx \boxed{\phantom{000}}$$

(Round to the nearest hundredth as needed.)

83. Solve.

$$3^{-x+2} = 22$$

$$x \approx \boxed{\phantom{000}}$$

(Simplify your answer. Type an integer or decimal rounded to four decimal places as needed.)

84. Solve the following logarithmic equation.

$$6 + \ln(8x) = 21 - 2 \ln(x)$$

$$x \approx \boxed{\phantom{000}}$$

(Do not round until the final answer. Then round to three decimal places as needed.)

85. Solve the logarithmic equation.

$$2 \log x - \log (10x - 250) - 1 = 0$$

$x =$

(Simplify your answer.)

86. Solve the logarithmic equation.

$$\log 2x + \log 5x = \log 250$$

$x =$   (Type an integer or a simplified fraction.)

87. During a 5-year period of constant inflation, the value of a \$103,000 property increases according to the equation  $v = 103,000 e^{0.02t}$  dollars. In how many years will the value of this building be double its current value?

It  years the value of the building will double its current value.

(Type an integer or a decimal rounded to two decimal places as needed.)

88. If a substance is injected into the bloodstream, the percent of the maximum dosage that is present at time  $t$  is given by  $y = 100(1 - e^{-0.37(10-t)})$ , where  $t$  is in hours, with  $0 \leq t \leq 10$ . In how many hours will the percent reach 31%?

The percent will reach 31% in  hours.

(Round to the nearest whole number as needed.)

89. At the end of  $t$  years, the future value of an investment of \$40,000 at 7%, compounded annually, is given by  $S = 40,000(1 + 0.07)^t$ . In how many years will the investment grow to \$103,141.37?

The investment will grow to \$103,141.37 in approximately  years.

(Do not round until the final answer. Then round to the nearest whole number as needed.)



90. The "Rule of 72" is a simplified way to determine how long an investment will take to double, given a fixed annual rate of interest. By dividing 72 by the annual interest rate, investors can get a rough estimate of how many years it will take for the initial investment to double. Algebraically we know that the time it takes an investment to double is  $\frac{\ln 2}{r}$ , when the interest is compounded continuously and  $r$  is written as a decimal. Complete parts (a)-(b).

- a) Complete the table to compare the exact time it takes for an investment to double to the "Rule of 72" time. (Round to two decimal places as needed.)

Annual Interest Rate	Rule of 72 Years	Exact Years
9%	<input type="text"/>	<input type="text"/>
10%	<input type="text"/>	<input type="text"/>
11%	<input type="text"/>	<input type="text"/>
12%	<input type="text"/>	<input type="text"/>
13%	<input type="text"/>	<input type="text"/>
14%	<input type="text"/>	<input type="text"/>
15%	<input type="text"/>	<input type="text"/>
16%	<input type="text"/>	<input type="text"/>
17%	<input type="text"/>	<input type="text"/>
18%	<input type="text"/>	<input type="text"/>

- b) Compute the differences between the two sets of outputs. What conclusion can you reach about using the Rule of 72 estimate?

- ☐ As interest rate increases, estimate gets apart from actual value.
- ☐ As interest rate increases, estimate gets closer to actual value.

91. Find the exponential function that models the data in the table below.

x	-4	-3	-2	-1	0	1	2	3
y	$\frac{3}{256}$	$\frac{3}{64}$	$\frac{3}{16}$	$\frac{3}{4}$	3	12	48	192

What is the exponential regression of the data?

$y =$

92. The table to the right gives the life expectancy for the birth years from 1920 and projected to 2020.

Use the table to answer parts (a)-(d) below.

Year	Life Span (years)	Year	Life Span (years)	Year	Life Span (years)
1920	54.1	1988	74.1	2001	77.2
1930	59.7	1989	75.2	2002	77.4
1940	62.9	1990	75.4	2003	77.5
1950	68.5	1992	75.9	2004	77.7
1960	69.7	1994	75.6	2005	77.8
1970	70.6	1996	76.2	2010	78.2
1975	72.5	1998	76.9	2015	78.7
1980	73.3	1999	76.9	2020	79.8
1987	75.1	2000	76.8		

- a. Find the logarithmic function that models the data, with  $x$  equal to 0 in 1900.

$$y = \boxed{\phantom{000}} + \boxed{\phantom{000}} \ln x$$

(Type integers or decimals rounded to the nearest thousandth as needed.)

- b. Find the quadratic function that is the best fit for the data, with  $x = 0$  in 1900. Round the quadratic coefficient to four decimal places and the other coefficients to three decimal places.

$$y = \boxed{\phantom{000}}$$

(Use integers or decimals for any numbers in the expression.)

- c. Graph each of these functions on the same axes with the data points to determine visually which function is the better model for the data for the years 1920-2020. Choose the correct answer below.

- ☐ The logarithmic model is better.
- ☐ The quadratic model is better.

- d. Evaluate both models for the birth year 2017.

The logarithmic model predicts that the life span of a person born in 2017 is  $\boxed{\phantom{000}}$  years.  
(Type an integer or a decimal rounded to the nearest tenth as needed.)

The quadratic model predicts that the life span of a person born in 2017 is  $\boxed{\phantom{000}}$  years.  
(Type an integer or a decimal rounded to the nearest tenth as needed.)

93. Average tuition and required fees at degree-granting institutions, for graduate and first professional fields of study, for the years 1988-89 through 2009-10 are given in the table. Use the table to answer parts (a) and (b) below.

Year	Current Dollars	Year	Current Dollars	Year	Current Dollars
1988 – 89	3765	1996 – 97	7129	2003 – 04	10,881
1989 – 90	4101	1997 – 98	7266	2004 – 05	11,004
1990 – 91	4408	1998 – 99	7651	2005 – 06	11,690
1991 – 92	5128	1999 – 2000	8079	2006 – 07	12,304
1992 – 93	5437	2000 – 01	8460	2007 – 08	12,844
1993 – 94	5966	2001 – 02	8814	2008 – 09	13,741
1994 – 95	6203	2002 – 03	9207	2009 – 10	14,789
1995 – 96	6716				

- a. Find an exponential function of the form  $y = a(b^x)$  to model the data, with  $x$  equal to the number of years from 1980 to the end of the academic year (1988-89 would be  $x = 9$ )

$$y = \boxed{\phantom{000000}}$$

(Use integers or decimals for any numbers in the expression. Round to the nearest thousandth as needed.)

- b. Use the model to estimate the tuition for 2014-15. Is this interpolation or extrapolation?

The model estimates that the tuition for 2014-15 will be \$ .

(Round to the nearest whole number as needed.)

Is this interpolation or extrapolation?

- ☐ extrapolation  
☐ interpolation

94. Evaluate the following expression for  $k = 4$  and  $n = 7$ .

$$19,000 \left( 1 + \frac{0.11}{k} \right)^{kn}$$

$$19,000 \left( 1 + \frac{0.11}{k} \right)^{kn} = \boxed{\phantom{000000}}$$

(Do not round until the final answer. Then round to two decimal places as needed.)

95. If \$14,000 is invested at 6% interest compounded monthly, find the interest earned in 16 years.

The interest earned in 16 years is \$ .

(Do not round until the final answer. Then round to two decimal places as needed.)

96. Suppose that  $P$  is invested in a savings account in which interest is compounded continuously at 6% per year. The amount  $A$  accumulated after time  $t$ , in years, is  $A = P e^{rt}$ . Find  $A$  if \$4000 is invested for 4 years.

If \$4000 is invested, what is the amount accumulated after 4 years? \$ .

(Round to the nearest cent.)

97.

Suppose that \$20000 is invested at 9% interest per year. Find the amount of money in the account after 7 years if the interest is compounded annually. Find the amount of money in the account after 7 years if the interest is compounded continuously.

If interest is compounded annually, what is the amount of money at  $t = 7$  years?

\$

(Simplify your answer. Type an integer or a decimal. Round to the nearest cent if needed.)

If interest is compounded continuously, what is the amount of money at  $t = 7$  years?

\$

(Simplify your answer. Type an integer or a decimal. Round to the nearest cent if needed.)

98. If money is invested at 10% interest, compounded quarterly, the future value of the investment doubles approximately every 7 years.

a. Use this information to complete the table below for an investment of \$900 at 10% interest, compounded quarterly.

Years	0	7	14	21	28
Future Value (\$)	900	?	?	?	?

Complete the following table.

Years	0	7	14	21	28
Future Value (\$)	900	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

b. Create an exponential function, rounded to three decimal places, that models the discrete function defined by the table.

Choose the correct exponential function, rounded to three decimal places, that models the discrete function defined by the table.

- ☐ A.  $y = 900(1.214)^x$
- ☐ B.  $y = 900(1.511)^x$
- ☐ C.  $y = 900(0.208)^x$
- ☐ D.  $y = 900(1.104)^x$

c. Because the interest is compounded quarterly, this model must be interpreted discretely. Use the rounded function to find the value of the investment in 5 years and in  $13\frac{1}{2}$  years.

The value of the investment in 5 years is \$ .  
(Round to the nearest cent as needed.)

The value of the investment in  $13\frac{1}{2}$  years is \$ .  
(Round to the nearest cent as needed.)

99. A couple wants to buy a house and can afford to pay \$1500 per month.

- If they can get a loan for 40 years with interest at 9% per year on the unpaid balance and make monthly payments, how much can they pay for a house?
- What is the total amount paid over the life of the loan?
- What is the total interest paid on the loan?

a. They can pay \$  for a house.

(Simplify your answer. Round to the nearest cent as needed.)

b. The total amount paid over the life of the loan is \$ .

(Simplify your answer. Round to the nearest cent as needed.)

c. The total interest paid on the loan is \$ .

(Simplify your answer. Round to the nearest cent as needed.)

100. The spread of a highly contagious virus in a high school can be described by the logistic function

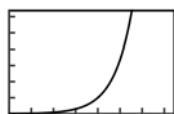
$$y = \frac{6400}{1 + 799e^{-0.6x}}$$

where  $x$  is the number of days after the virus is identified in the school and  $y$  is the total number of people who are infected by the virus.

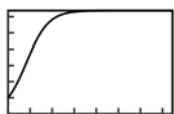
- Graph the function for  $0 \leq x \leq 15$ .
- How many students had the virus when it was first discovered?
- What is the upper limit of the number infected by the virus during this period?

(a) Choose the correct graph below.

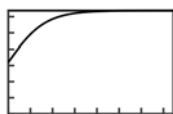
☐ A.



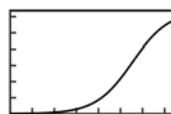
☐ B.



☐ C.



☐ D.



$[0, 15]$  by  $[0, 6400]$ ,  $X_{\text{scl}} = 2$ ,  $Y_{\text{scl}} = 1000$

(b) The number of students who had the virus when it was first discovered is .

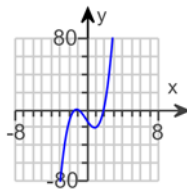
(c) The upper limit of the number infected by the virus during the period is .

101. Match the polynomial function with its graph.

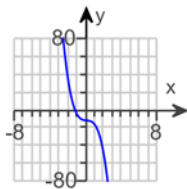
$$y = 5x^3 + 2x^2 - 15x - 12$$

Choose the correct graph below.

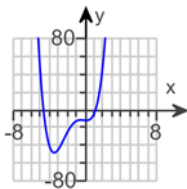
☐ A.



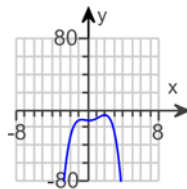
☐ B.



☐ C.



☐ D.



102. Use the equation of the polynomial function  $f(x) = 4x^3 - x$  to complete the following.

- (a) State the degree and the leading coefficient.  
 (b) Describe the end behavior of the graph of the function.  
 (c) Support your answer by graphing the function.

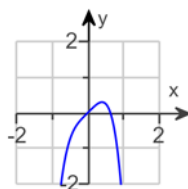
(a) The degree of the polynomial is  and the leading coefficient is .

(b) Describe the end behavior of the graph of the function.

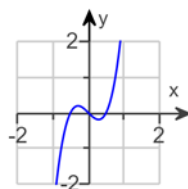
The curve opens (1)  to the right because the leading coefficient is (2) . Because the polynomial is (3)  the graph has end behaviors in the (4)  direction, so the other end opens (5)  to the left.

(c) Which of the following is the correct graph of the function  $f(x) = 4x^3 - x$ ?

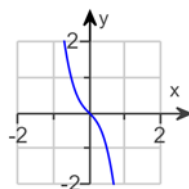
☐ A.



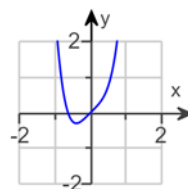
☐ B.



☐ C.



☐ D.



- (1) ☐ up ☐ down      (2) ☐ positive ☐ negative      (3) ☐ quartic, ☐ cubic,      (4) ☐ opposite ☐ same      (5) ☐ up ☐ down

103. Solve the equation.

$$(x + 7)^2(x - 9)(2x - 5) = 0$$

$x =$

(Use a comma to separate answers as needed. Type an integer or a simplified fraction.)

104. Solve the polynomial equation by factoring.

$$n^3 - 2n^2 - n + 2 = 0$$

$n =$

(Simplify your answer. Use a comma to separate answers as needed.)

105. Use factoring by grouping to solve the equation.

$$2x^3 - x^2 - 98x + 49 = 0$$

The solutions are

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

106.

Use the graph of the polynomial function  $f(x)$  **(a)** to solve  $f(x) = 0$ , and **(b)** find the factorization of  $f(x)$ .

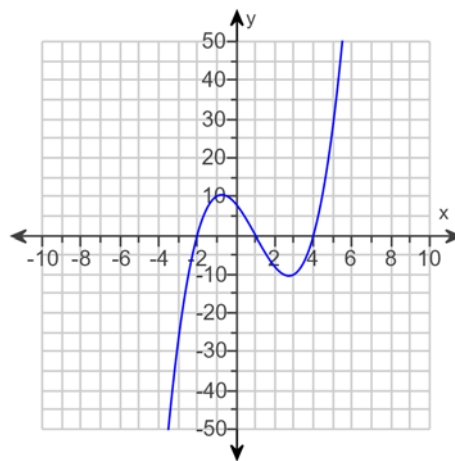
$$f(x) = x^3 - 3x^2 - 6x + 8$$

**(a)**  $x =$

(Use a comma to separate answers as needed. Type an integer or a simplified fraction.)

**(b)** The factorization of the polynomial function  $f(x)$  is

(Type your answer in factored form.)



107.

Use the graph of the polynomial function  $f(x)$  **(a)** to solve  $f(x) = 0$ , and **(b)** find the factorization of  $f(x)$ .

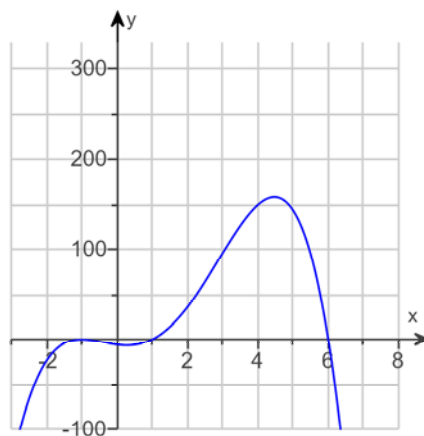
$$f(x) = -x^4 + 5x^3 + 7x^2 - 5x - 6$$

**(a)** Choose the correct solution for  $f(x) = 0$ .

- ☐ A.  $x = 1$  and  $x = 6$
- ☐ B.  $x = -1$ ,  $x = 1$ , and  $x = 6$
- ☐ C.  $x = 1$ ,  $x = -1$ , and  $x = -6$
- ☐ D.  $x = -1$  and  $x = -6$

**(b)** The factorization of the polynomial function  $f(x)$  is

(Type your answer in factored form.)



108. Find the solutions graphically.

$$6x^3 - 9x^2 - 33x + 18 = 0$$

The solutions are .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

109. Find all rational zeros of  $f(x) = x^3 + x^2 - 17x + 15$ .

The rational zeros are .

(Use a comma to separate answers as needed.)

110. Find all rational zeros of the polynomial function.

$$f(x) = 2x^3 - 3x^2 - 50x + 75$$

The rational zeros of the polynomial function are .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

111. Find the horizontal and vertical asymptotes, and graph the rational function.

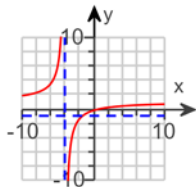
$$f(x) = \frac{x+1}{x-4}$$

The equation of the vertical asymptote is  $x =$  .

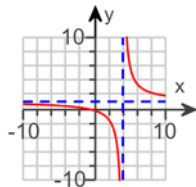
The equation of the horizontal asymptote is  $y =$  .

Choose the correct graph of the function.

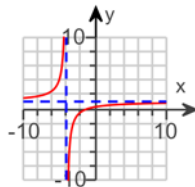
☐ A.



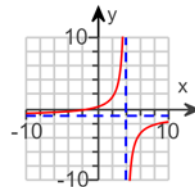
☐ B.



☐ C.



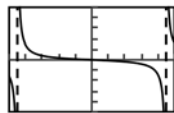
☐ D.



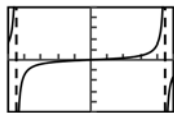
112. For the function  $f(x) = \frac{9x}{x^2 - 36}$ , graph the function, and list all asymptotes.

Choose the correct graph.

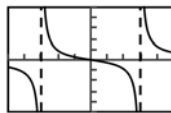
☐ A.



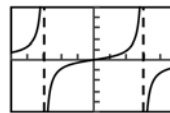
☐ B.



☐ C.



☐ D.



$[-10, 10, -10, 10]$  Xscl = 2 Yscl = 2

Choose the correct asymptotes.

☐ A.  $x = 9, x = -9$

☐ B.  $x = 6, x = -6, y = 0$

☐ C.  $x = 9, x = -9, y = 0$

☐ D.  $x = 6, x = -6$



113. Suppose the concentration of a drug (as a percent) in a patient's bloodstream  $t$  hours after injection is given by the following equation.

$$C(t) = \frac{250t}{3t^2 + 75}$$

Complete parts (a) through (d).

- (a) What is the drug concentration 1 hour after injection?

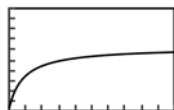
% (Round to the nearest hundredth as needed.)

What is the drug concentration 6 hours after injection?

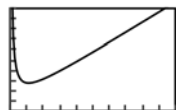
% (Round to the nearest hundredth as needed.)

- (b) Graph the function using the window  $[0, 20]$  by  $[0, 20]$ . Choose the correct graph below.

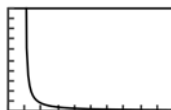
☐ A.



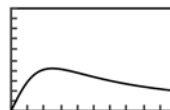
☐ B.



☐ C.



☐ D.



Use  $[0, 20]$  by  $[0, 20]$ ,  $x_{\text{scl}} = 2$ ,  $y_{\text{scl}} = 2$ .

- (c) What is the highest percent concentration?

% (Round to the nearest hundredth as needed.)

In how many hours will the highest percent concentration occur?

hours (Round to the nearest whole number as needed.)

- (d) Describe how the end behavior of the graph of this function relates to the drug concentration. Choose the correct answer below.

- ☐ A. Concentration increases over the first 5 hours and then decreases approaching 0% as  $t$  approaches  $\infty$ .
- ☐ B. Concentration increases continuously as time increases.

114. Solve the system of equations.

$$\begin{cases} x + 2y - z = 3 \\ x + 3y + z = -8 \\ x - 5y + 3z = -10 \end{cases}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ☐ A. The one solution is  $x =$  \_\_\_\_\_,  $y =$  \_\_\_\_\_, and  $z =$  \_\_\_\_\_.  
(Simplify your answers.)
- ☐ B. There are infinitely many solutions. If  $z$  is allowed to be any real number, then  
 $x =$  \_\_\_\_\_ and  $y =$  \_\_\_\_\_.  
(Type expressions using  $z$  as the variable.)
- ☐ C. There is no solution.

115. A concert promoter needs to make \$181,000 from the sale of 2700 tickets. The promoter charges \$70 for some tickets and \$60 for the others.

a. If there are  $x$  of the \$70 tickets and  $y$  of the \$60 tickets, Write an addition equation that states that the total number of the tickets sold is 2700.

(Do not simplify.)

b. How much money is made from the sale of  $x$  tickets at \$70 each?

c. How much money is made from the sale of  $y$  tickets at \$60 each?

d. Write an equation that states that the total amount made from the sale is \$181,000.

(Do not simplify.)

e. Solve the equations simultaneously to find how many tickets of each type must be sold to yield the \$181,000.

There are  tickets of \$70 and  tickets of \$60.

1. 7

12

2. 6

12

1

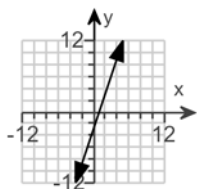
3.  $[-5, 4]$  $[-6, 1]$ 4.  $[7, \infty)$ 5. A. If the car is financed over 5 years, the payment is  $P(5) =$   dollars.A.  $C(4) =$  

5

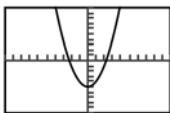
873.12

x	-2	-1	0	1	2
f(x)	<input type="text" value="-9"/>	<input type="text" value="-6"/>	<input type="text" value="-3"/>	<input type="text" value="0"/>	<input type="text" value="3"/>

6. A. (Type integers or simplified fractions.)



A.

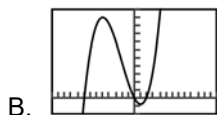


7. C.

A. The graph has a turning point in this window. The turning point(s) is/are .

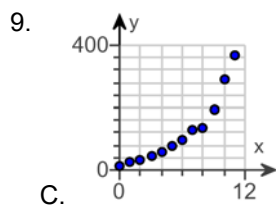
(Type an ordered pair. Use a comma to separate answers as needed.)

8. B.  $[-13, 13]$  by  $[-20, 110]$



A. The graph has a turning point in this window. The turning point(s) is/are  $(1, -8), (-5, 100)$ .  
(Type an ordered pair. Use a comma to separate answers as needed.)

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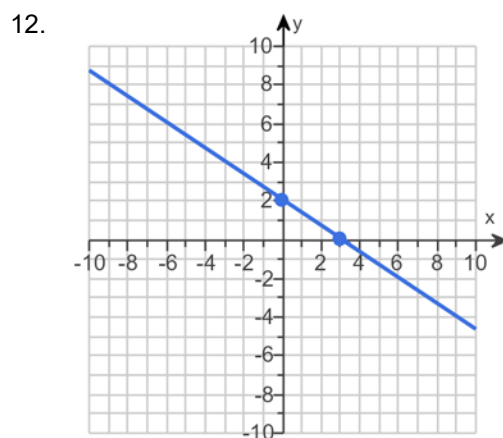
10. 720

2020

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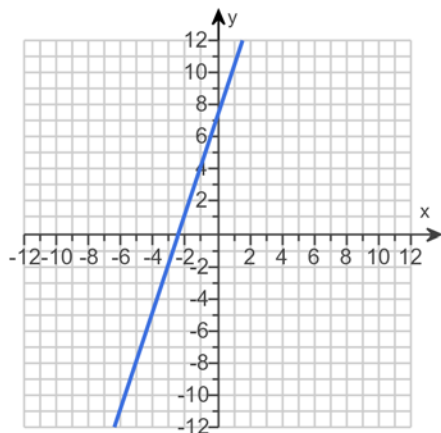
11. A. The slope is  $\frac{1}{2}$ . (Type an integer or a simplified fraction.)

---



13. A. The slope is . (Simplify your answer.)

A. The y-intercept is . (Type an integer or a simplified fraction.)



---

14. 6

---

15. A. The rate of change is . (Type an integer or a simplified fraction.)

---

16.  $-\frac{6}{7}x - 1$

---

17. -7

---

18.  $4x + 2h$

---

19. 0.02  
 $0.02x + 0.04$

---

20. 0.07  
 $0.07x$

---

21. -4

---

22. 1

---

23. (1) &gt;

$$-\frac{4}{3}$$


---

24. (1) &gt;

$$\frac{15}{4}$$


---

25. - 1

26. - 20

- 20

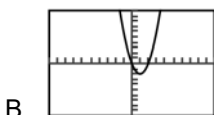
- 20

27.  $\frac{D - B}{Br}$

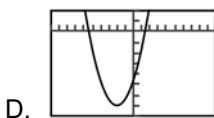
28.  $\frac{9m}{2} - \frac{P}{4} - \frac{A}{2}$

29. D.  $y = 4(x - 1)^2 - 4$

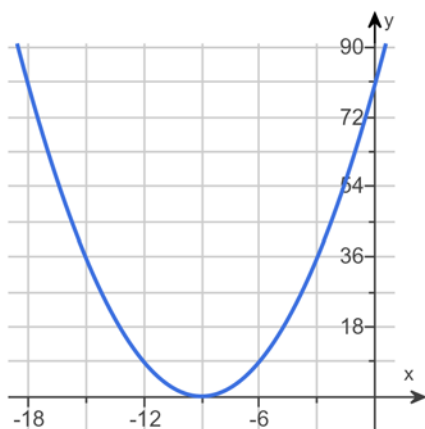
30. (1, - 2)



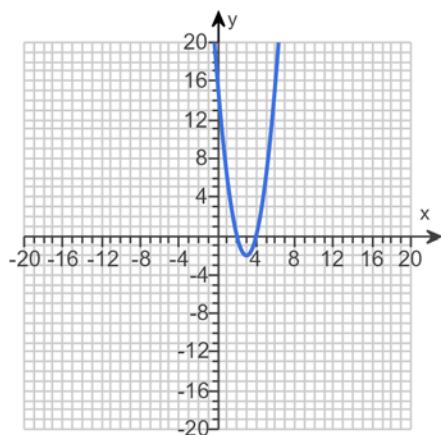
31. (- 2, - 35)



32.



33.



2,4

34. Yes

490,000

35. - 1,8

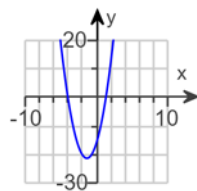
36. 3,8

37. 8, - 1

38.  $-\frac{9}{5}, -6$ 39.  $-\frac{7}{4}, -6$

40. A. The x-intercept(s) is/are  $x = \boxed{-3, 9}$ . (Simplify your answer. Use a comma to separate answers as needed.)

---



41. C.

A. The solution(s) is/are  $\boxed{\frac{4}{3}, -4}$ .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

---

42. 3, 10

---

43.  $\frac{-3 + \sqrt{29}}{2}, \frac{-3 - \sqrt{29}}{2}$

---

44.  $-\frac{1}{3}, -2$

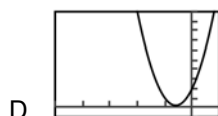
---

45. A. The solution(s) is/are  $x = \boxed{-3, 2}$ .

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

---

46.  $-6 + 2i, -6 - 2i$



47.  $\frac{3}{2}, \frac{5}{2}$

---

48.  $685x - 22,750 - x^2$

(1) loss

4984

(2) profit

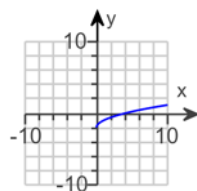
3654

650, 35

---

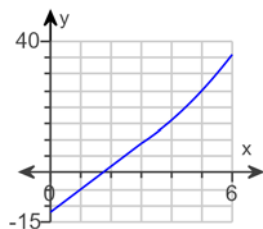


49.



C.

50.



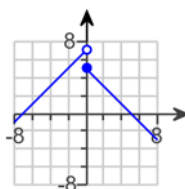
A.

2

16

D. The domain of the function is all real numbers.

51.



B.

52. A. The solution(s) is/are  $x =$   .(Simplify your answer. Use a comma to separate answers as needed.)

53.  $0.18x$ 

$$8,182.80 + 0.28(x - 45,460)$$

$$6,480.00$$

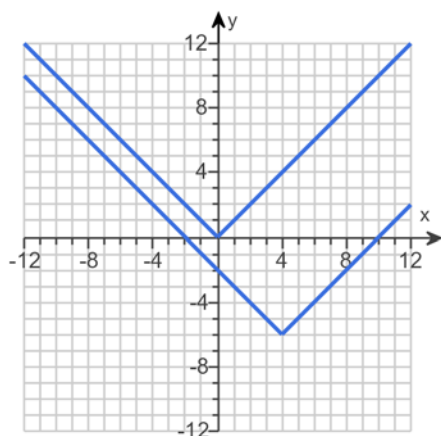
$$13,094.00$$

$$8,182.80$$

$$8,183.08$$

No

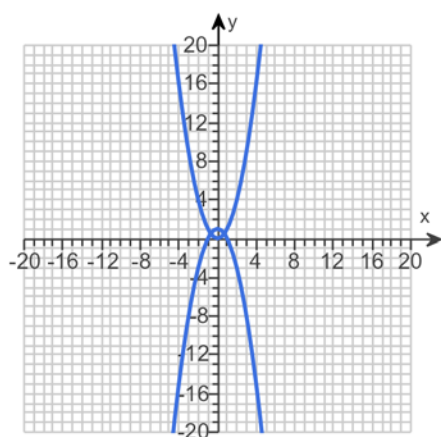
54.



D. Vertical shift 6 units down and horizontal shift 4 units right

---

55.



A. reflection across the x-axis and vertical shift 1 unit up

---

56. A. It is symmetric with respect to the origin.

---

57. A. The graph is symmetric with respect to the origin.

---

58. A. Even

---

59.  $4x^2 + 5x + 2$

$4x^2 - 5x + 6$

$20x^3 - 8x^2 + 20x - 8$

$\frac{4x^2 + 4}{5x - 2}$

C. All real numbers except  $\frac{2}{5}$

---

60. 16

- 48

- 35

7

61.  $-24x + 56$  $-24x + 32$ 62.  $x$  $x$ 

63. 0

5

- 1

- 8

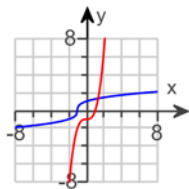
64. No

65. Yes

A.  $f^{-1}(x) = \boxed{\frac{x+6}{5}}$  (Simplify your answer.)

66.  $\frac{x-4}{6}$ 

67.



C.

68.  $x - 2$ 

SHE WENT THERE

69.  $-1 < x < 8$ 70. E.  $x \leq -6$  or  $x \geq 7$

71.  $-2 < x < 4$

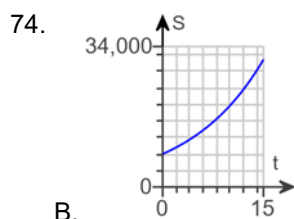
---

72. B.  $\boxed{-1} \leq x \leq \boxed{\frac{13}{5}}$  (Simplify your answers.)

---

73.  $x < -1, x > 11$

---



C.  $t \approx 12.21$  years

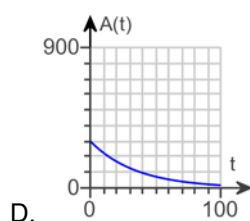
14

19,676.82

30,859.40

---

75. 111.53



C. about 24.52 years

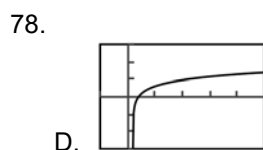
---

76.  $2^B = A$

---

77.  $y = \log_8 x$

---



79.  $\log_2 \frac{\sqrt[6]{5x+1}}{5x^2} = \frac{1}{6} \log_2(5x+1) - 2 \log_2(x) - \log_2 5$

---

80.  $\log_4 x^5 z^9$

---

81. 2.275

---

82. 0.66

---

83.  $-0.8136$

---

84. 74.207

---

85. 50

---

86. 5

---

87. 34.66

---

88. 9

---

89. 14

---

90. 8.00

7.70

7.20

6.93

6.55

6.30

6.00

5.78

5.54

5.33

5.14

4.95

4.80

4.62

4.50

4.33

4.24

4.08

4.00

3.85

As interest rate increases, estimate gets closer to actual value.

---

91.  $3(4^x)$ 

92. 11.068

14.288

$$-0.0017x^2 + 0.476x + 46.566$$

The logarithmic model is better.

79.1

79.0

93.  $2371.399(1.063^x)$ 

20,122

extrapolation

---

94. 40,611.11

95. 22,476.39

---

96. 5085.00

---

97. 36560.78

37552.21

---

98. 1800

3600

7200

14,400

D.  $y = 900(1.104)^x$

1476.01

3422.35

---

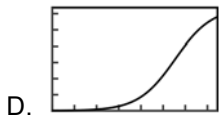
99. 194,461.35

720,000.00

525,538.65

---

100.

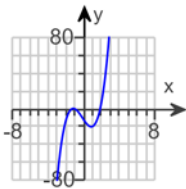


8

6400

---

101.



A.

---

102. 3

4

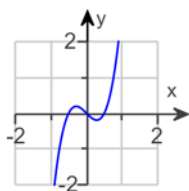
(1) up

(2) positive

(3) cubic,

(4) opposite

(5) down



B.

103.  $-7, 9, \frac{5}{2}$ 

104. 1, -1, 2

105.  $7, -7, \frac{1}{2}$ 

106. -2, 1, 4

$$(x + 2)(x - 1)(x - 4)$$

107. B.  $x = -1$ ,  $x = 1$ , and  $x = 6$ 

$$-(x + 1)^2(x - 1)(x - 6)$$

108.  $-2, 3, \frac{1}{2}$ 

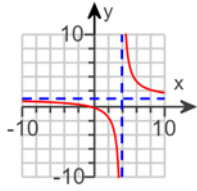
109. 1, 3, -5

110.  $-5, 5, \frac{3}{2}$



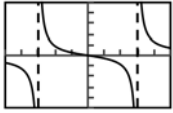
111. 4

1



B.

112.

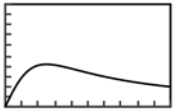


C.

B.  $x = 6$ ,  $x = -6$ ,  $y = 0$ 

113. 3.21

8.2



D.

8.33

5

A. Concentration increases over the first 5 hours and then decreases approaching 0% as  $t$  approaches  $\infty$ .114. A. The one solution is  $x = \boxed{0}$ ,  $y = \boxed{-1}$ , and  $z = \boxed{-5}$ . (Simplify your answers.)115.  $x + y = 2700$  $70x$  $60y$  $70x + 60y = 181,000$ 

1900

800