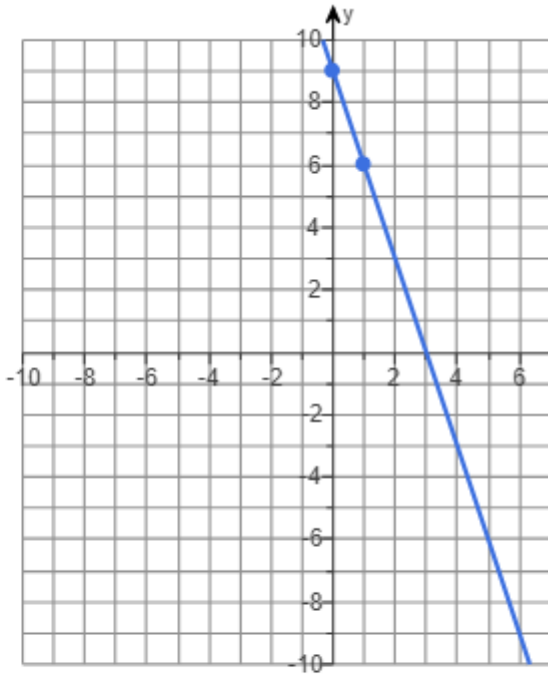
1) Find the slope and y-intercept of the line. Graph the line.

$3x + y = 9$ $y = -3x + 9$



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

A. Slope = -3 (Type an integer or a simplified fraction.)

B. The slope is undefined.

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

A. The y-intercept is 9. (Type an integer or a simplified fraction.)

B. The line $3x + y = 9$ does not have a y-intercept.

2) Follow the steps for graphing a rational function to graph the function $R(x) = \frac{x^2}{x^2 - x - 20}$.

CHOOSE THE GRAPH FIRST THEN USE IT FOR YOUR ANSWERS $(x-5)(x+4)$

What is the domain of R(x)? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. $\{x | x \neq -4, 5\}$

Locate the intercept(s) of the graph. Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

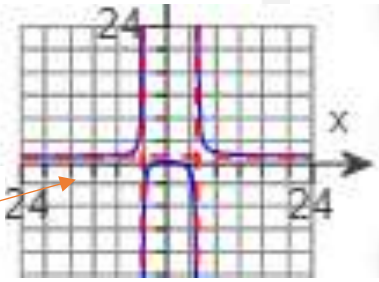
Solve the top set x = 0

A. The graph has x-intercept(s) 0 and y-intercept 0.

B. The graph will touch but not cross the x-axis at $x = 0$.

B. The function has two vertical asymptotes. The leftmost asymptote is $x = -4$, and the rightmost asymptote is $x = 5$.

A. The function has one horizontal asymptote, $y = 1$. $\frac{1x^2}{1x^2 - x - 20}$.



A. The graph of R intersects the horizontal or oblique asymptote at $(-20, 1)$.

3) Find the domain of the function.

$f(x) = \sqrt{3x - 15}$ $3x - 15 \geq 0$

$x \geq 5$

The domain is $[5, \infty)$. (Type your answer in interval notation.)

4)

I	II	I	II
The x-intercept is $(-3, 0)$. solve the top	$f(x) = \frac{x+3}{x-6}$	There is a hole in the graph at $(-9, -18)$.	$f(x) = \frac{x^2 - 81}{x+9}$
The y-intercept is $(0, 4)$. set x = 0	$f(x) = \frac{x+12}{x+3}$	The graph has an oblique asymptote.	$f(x) = \frac{x^2 + 5x + 6}{x-7}$
The horizontal asymptote is $y = 7$. 7 top left	$f(x) = \frac{7x+5}{x-12}$	The x-axis is its horizontal asymptote and the y-axis is not its vertical asymptote.	$f(x) = \frac{1}{x+6}$
The vertical asymptote is $x = -8$. solve bottom	$f(x) = \frac{x+6}{x+8}$	The x-axis is its horizontal asymptote and the y-axis is its vertical asymptote.	$f(x) = \frac{-8}{x^2}$

5) Suppose that $10,272 is invested at an interest rate of 5.8% per year, compounded continuously.

a) Find the exponential function that describes the amount in the account after time t, in years.
b) What is the balance after 5 years?

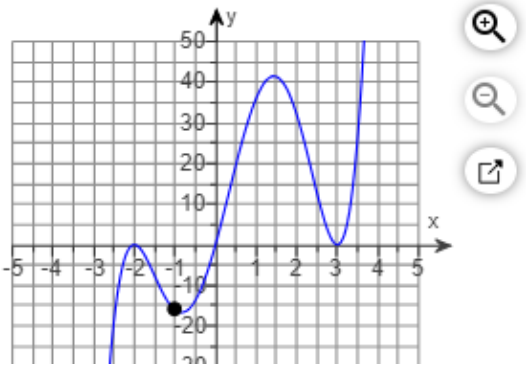
$A = Pe^{rt}$

a) The exponential growth function is $P(t) = 10{,}272e^{0.058t}$.
(Type exponential notation with positive exponents. Do not simplify. Use integers or decimals for any numbers in the equation.)

$10272e^{0.058 \cdot 5}$

b) The balance after 5 years is $ 13,727.78.
(Simplify your answers. Round to two decimal places as needed.)

6) Write a polynomial function whose graph is shown below (use the smallest degree possible). The coordinates of the indicated point are $(-1, -16)$.



Which of the following is a polynomial function tha might have the given graph?

Touches at x = -2 and x = 3...exponent of 2

- A. $f(x) = x(x+2)^2(x-3)^2$
- B. $f(x) = x(x+2)(x-3)$
- C. $f(x) = x(x+2)^2(x+3)^2$
- D. $f(x) = x(x-2)^2(x-3)^2$
- E. $f(x) = -x(x+2)^2(x-3)^2$
- F. $f(x) = -x(x+2)(x-3)$

7) For the quadratic function defined, **(a)** write the function in the form $P(x) = a(x-h)^2 + k$, **(b)** give the vertex of the parabola, and **(c)** graph the function.

$P(x) = x^2 + 8x$ $\quad x = \frac{-8}{2(1)} = -4$ $\quad y = (-4)^2 + 8(-4) = -16$

if the graph point down then put $-(x+4)^2 - 16$

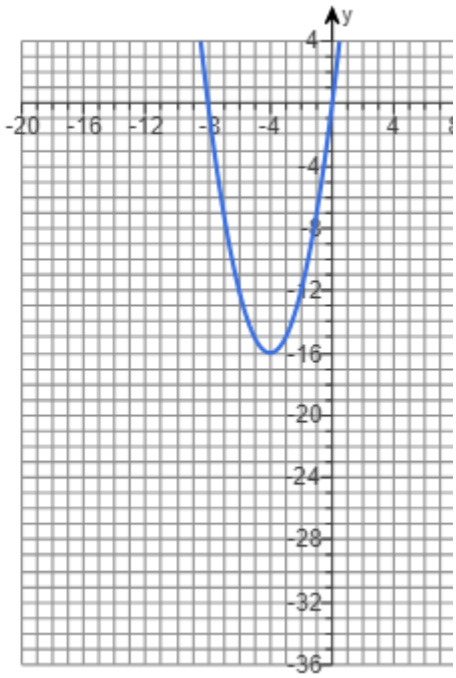
a. $P(x) =$ $(x+4)^2 - 16$ Use the vertex for the equation

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

b. The vertex is $(-4, -16)$.

(Simplify your answer. Type an ordered pair, using integers or fractions.)

c. Use the graphing tool to graph the function.



8) Find the real solutions, if any, of the following equation.

$x^2 - 8x - 2 = 0$

36-2

$$x = \frac{8 \pm \sqrt{64 - 4(1)(-2)}}{2(1)} = \frac{8 \pm \sqrt{72}}{2} = \frac{8 \pm 6\sqrt{2}}{2}$$

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

- A. The solution set is $\{4 + 3\sqrt{2}, 4 - 3\sqrt{2}\}$.

9) Solve the equation.

$\log_2(4x+5)=5$

Change the given logarithmic equation to exponential form.

$4x+5=2^5$

(Type an equation. Do not simplify.)

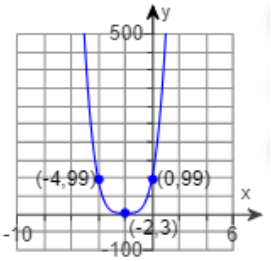
The solution set is $\left\{\frac{27}{4}\right\}$.

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

10) Use transformations of the graph of $y=x^4$ to graph the function.

$h(x)=6(x+2)^4+3$

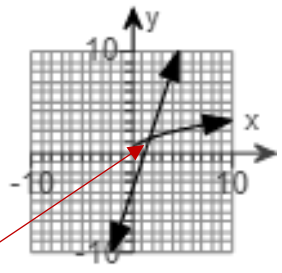
C. The graph of $y=x^4$ should be shifted horizontally to the left by 2 units, stretched vertically by multiplying each y-coordinate by 6, and shifted vertically up 3 units.



11) Begin by drawing a rough sketch to determine the number of real solutions for the equation $y_1=y_2$. Then, solve this equation by hand. Give the solution set and any extraneous values that might occur. Do not use a calculator.

$y_1=\sqrt{x}$

$y_2=3x-4$



The equation has 1 real solution(s).

(Type a whole number.)

The solution set is $\left\{\frac{16}{9}\right\}$.

DOES NOT INTERSECT AT X = 1, the solution is $\frac{4^2}{3^2}=\frac{16}{9}$

(Type an integer or a simplified fraction. Use a c

Are there any extraneous values? Select the cor
your choice.

A. The extraneous values is/are 1.

12) Solve the following logarithmic equation. Express irrational solutions in exact form.

$\log(4x+1) = 1 + \log(x-9)$ $\log_{10}(4x+1) - \log(x-9) = 1$

Rewrite the given equation without logarithms. Do not solve for x.

$$\frac{4x+1}{x-9} = 10$$

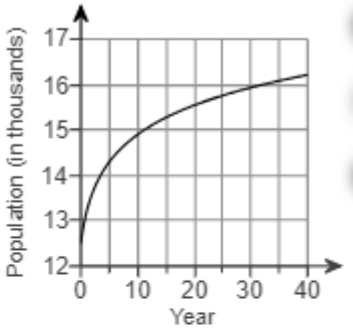
(Do not simplify. Use integers or fractions for any numbers in the equation.)

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

A. The solution set is $\left\{\frac{91}{6}\right\}$.

13) The population of an animal in a national forest is modeled by the formula $P = 12{,}500 + 1000 \cdot \ln(t+1)$, where t is the number of years from the present.

(a) Use the formula to determine how many animals are now in the forest.
(b) Use the accompanying graph to estimate the number of years that it will take for the animal population to reach 14,000.
(c) Use the formula to determine the number of years that it will take for the animal population to reach 14,000.



(a) At present, there are 12,500 animals in the forest.

(b) It will take approximately 5 years for the animal population to reach 14,000. Use graph

(c) It will take approximately 3.5 years for the animal population to reach 14,000.
(Round to one decimal place as needed.)

$14000 = 12500 + 1000 \ln(t+1)$
$1500 = 1000 \ln(t+1)$
$1.5 = \ln(t+1)$

$e^{1.5)} - 1$

14) The function $f(x) = x^2 + 6$, $x \geq 0$ is one-to-one.

(a) Find the inverse of f.

(b) Find the range of f^{-1}.

(c) Graph f, f^{-1}, and y = x on the same coordinate axes.

(a) $f^{-1}(x) = \sqrt{x-6}$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

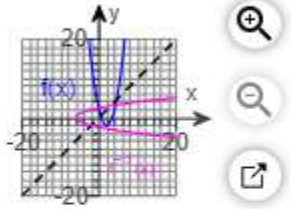
(b) Find the range of f^{-1}. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The range is $\{y | y \leq \ \}$.

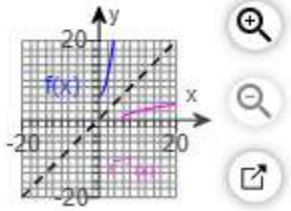
B. The range is $\{y | y \geq 0\}$.

(c) Graph f, f^{-1}, and y = x
axes. The graph of y = x is
Choose the correct graph

A.



C.



15) Solve the following equation by factoring.

$10(p^2 - 1) = 21p$

$10p^2 - 21p - 10 = 0$

$(5p + 2)(2p - 5) = 0$

Rewrite the equation in a completely factored form.

$(2p - 5)(5p + 2) = 0$

(Type your answer in factored form.)

The solution set is $\left\{\frac{5}{2}, -\frac{2}{5}\right\}$.

16) Solve the equation.

$3x - (6x + 9) = 3x - 39$

$3x - 6x - 9 = 3x - 39$

$-3x - 9 = 3x - 39$

$-6x = -30$

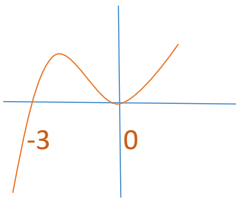
Select the correct choice below and fill in any answer boxes in your choice.

A. The solution set is $\{5\}$. (Simplify your answer.)

17) Solve the inequality algebraically. $2x^3 > -6x^2$

$2x^3 + 6x^2 > 0$

$2x^2 (x + 3) > 0$



Crosses at x = -3 and touches at x = 0

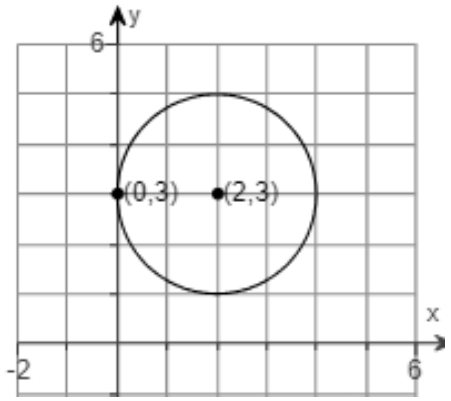
List the intervals and sign in each interval. Complete the following table.
(Type your answers in interval notation. Use ascending order.)

Interval	$(-\infty, -3)$	$(-3, 0)$	$(0, \infty)$
Sign	Negative	Positive	Positive

What is the solution?

$(-3, 0) \cup (0, \infty)$ Positives because >

18) Find the center and radius of the circle. Write the standard form of the equation.

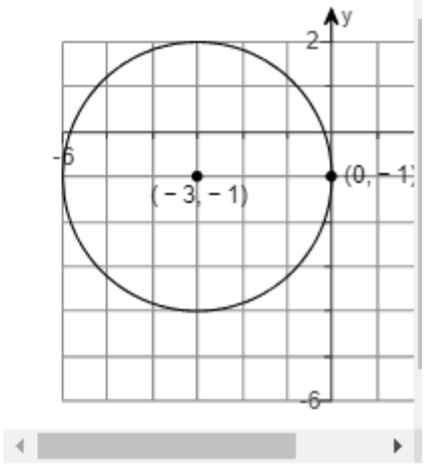


The center of the circle is $(h,k) =$ $(2,3)$.
(Type an ordered pair.)

The radius of the circle is $r =$ 2.

The equation of the circle in standard form is $(x-2)^2 + (y-3)^2 = 4$.
(Type your answer in standard form.)

1) Find the center and radius of the circle.
Write the standard form of the equation.



The center of the circle is (h,k) = $(-3, -1)$.
(Type an ordered pair.)

The radius of the circle is r = 3.

The equation of the circle in standard form is $(x+3)^2 + (y+1)^2 = 9$.
(Type your answer in standard form.)

2) Solve the following logarithmic equation. Express irrational solutions in exact form.

$\log_{10}(4x+1) - \log(x-5) = 1$

log $(4x+1) = 1 +$ **log** $(x-5)$

Rewrite the given equation without logarithms. Do not solve for x.

$$\frac{4x+1}{x-5} = 10$$

(Do not simplify. Use integers or fractions for any numbers in the equation.)

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

A. The solution set is $\left\{\frac{17}{2}\right\}$.

3) Solve the following equation by factoring.

$12(p^2 - 1) = 7p$

$12p^2 - 7p - 12 = 0$

$(4p + 3)(3p - 4) = 0$

Rewrite the equation in a completely factored form.

$(3p - 4)(4p + 3) = 0$

(Type your answer in factored form.)

The solution set is $\left\{\frac{4}{3}, -\frac{3}{4}\right\}$.

4) For the quadratic function defined, **(a)** write the function in the form $P(x) = a(x - h)^2 + k$, **(b)** give the vertex of the parabola, and **(c)** graph the function.

$P(x) = x^2 - 4x - 8$ $x = \frac{4}{2(1)} = 2$ $y = (2)^2 - 4(2) - 8 = -12$

use vertex to write equation

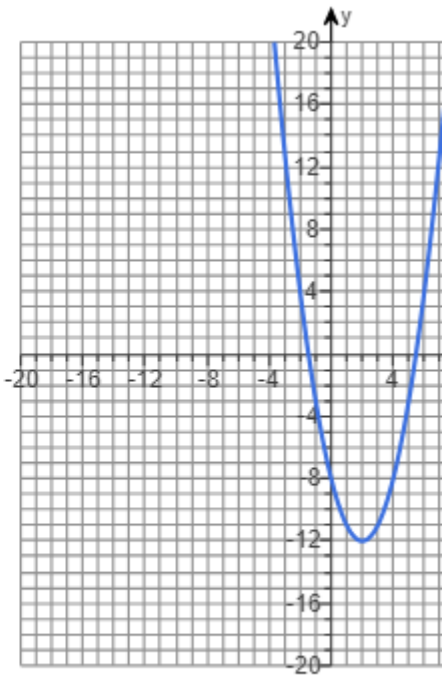
a. $P(x) = (x - 2)^2 - 12$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

b. The vertex is $(2, -12)$.

(Simplify your answer. Type an ordered pair, using integers or fractions.)

c. Use the graphing tool to graph the function.



5) Find the real solutions, if any, of the following equation.

$x^2 + 16x + 7 = 0$ $4 \cdot 57$

$x = \frac{-16 \pm \sqrt{256 - 4(1)(7)}}{2(1)} = \frac{-16 \pm \sqrt{228}}{2} = \frac{-16 \pm 2\sqrt{57}}{2}$

The solution set is $\left\{-8 + \sqrt{57}, -8 - \sqrt{57}\right\}$.

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

6) The function $f(x) = x^2 + 7$, $x \geq 0$ is one-to-one.

(a) Find the inverse of f.

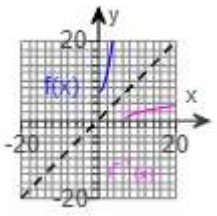
(b) Find the range of f^{-1}.

(c) Graph f, f^{-1}, and $y = x$ on the same coordinate axes.

(a) $f^{-1}(x) = \sqrt{x - 7}$

(b) The range is $\{y \mid y \geq 0\}$.

(c)



7)

I	II	I	II
The x-intercept is $(-5, 0)$. solve the top	$f(x) = \frac{x+5}{x-10}$	There is a hole in the graph at $(-6, -12)$.	$f(x) = \frac{x^2-36}{x+6}$
The y-intercept is $(0, 5)$. set x = 0	$f(x) = \frac{x+15}{x+3}$	The graph has an oblique asymptote.	$f(x) = \frac{x^2+6x+7}{x-8}$
The horizontal asymptote is $y = 7$. 7 top left	$f(x) = \frac{7x+6}{x-13}$	The x-axis is its horizontal asymptote and the y-axis is not its vertical asymptote.	$f(x) = \frac{1}{x+2}$
The vertical asymptote is $x = -4$. solve bottom	$f(x) = \frac{x+7}{x+4}$	The x-axis is its horizontal asymptote and the y-axis is its vertical asymptote.	$f(x) = \frac{-7}{x^2}$

8) Solve the equation.

$\log_2(2x + 5) = 4$

Change the given logarithmic equation to exponential form

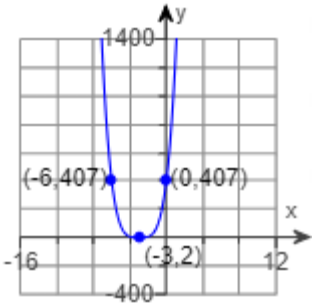
$2x + 5 = 2^4$

(Type an equation. Do not simplify.)

The solution set is $\left\{\frac{11}{2}\right\}$.

9) Use transformations of the graph of $y = x^4$ to graph the function.

$h(x) = 5(x + 3)^4 + 2$

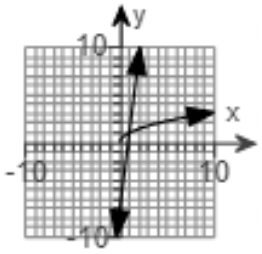


The graph of $y = x^4$ should be shifted horizontally to the left by 3 units, stretched vertically by multiplying each y-coordinate by 5, and shifted vertically up 2 units.

10) Begin by drawing a rough sketch to determine the number of real solutions for the equation $y_1 = y_2$. Then, solve this equation by hand. Give the solution set and any extraneous values that might occur. Do not use a calculator.

$y_1 = \sqrt{x}$

$y_2 = 8x - 7$



The equation has 1 real solution(s).
(Type a whole number.)

DOES INTERSECT AT X = 1, the extraneous solution is $\frac{7^2}{8^2} = \frac{49}{64}$

The solution set is {1}.
(Type an integer or a simplified fraction. Use a comm

Are there any extraneous values? Select the correct choice.

A. The extraneous values is/are $\frac{49}{64}$.

11) Find the slope and y-intercept of the line. Graph the line.

$7x - 3y = 21$ $-3y = -7x + 21$ divide by -3

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

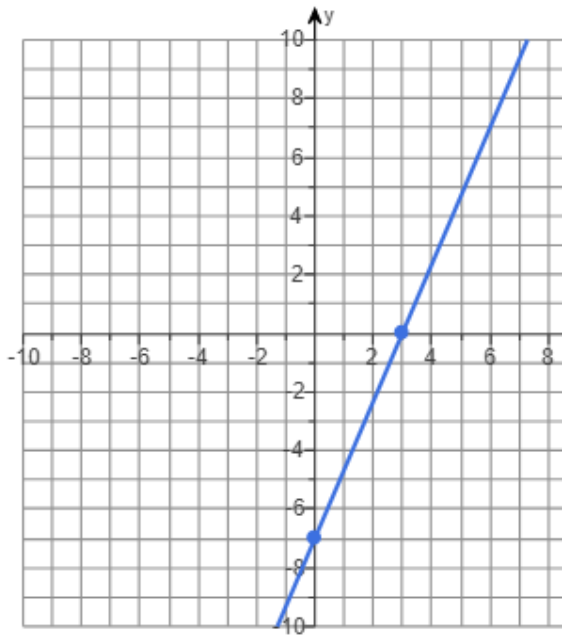
A. The slope is $\frac{7}{3}$.
(Type an integer or a simplified fraction.)

B. The slope is undefined.

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

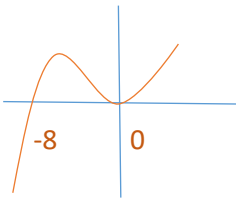
A. The y-intercept is -7.
(Type an integer or a simplified fraction.)

B. There is no y-intercept.



12) 17) Solve the inequality algebraically. $3x^3 + 24x^2 > 0$

$3x^2 (x + 8) > 0$



$3x^3 > -24x^2$

Crosses at x = -8 and touches at x = 0

List the intervals and sign in each interval. Complete the following table.
(Type your answers in interval notation. Use ascending order.)

Interval	$(-\infty, -8)$	$(-8, 0)$	$(0, \infty)$
Sign	Negative	Positive	Positive

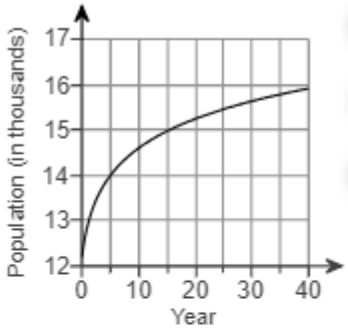
What is the solution?

$(-8, 0) \cup (0, \infty)$

Positives because >

13) The population of an animal in a national forest is modeled by the formula $P = 12{,}200 + 1000 \cdot \ln(t + 1)$, where t is the number of years from the present.

(a) Use the formula to determine how many animals are now in the forest.
(b) Use the accompanying graph to estimate the number of years that it will take for the animal population to reach 15,000.
(c) Use the formula to determine the number of years that it will take for the animal population to reach 15,000.



(a) At present, there are 12,200 animals in the forest.

(b) It will take approximately 15 years for the animal population to reach 15,000.

Use graph

(c) It will take approximately 15.4 years for the animal population to reach 15,000.
(Round to one decimal place as needed.)

$15000 = 12200 + 1000 \ln(t+1)$

$2800 = 1000 \ln(t+1)$

$2.8 = \ln(t+1)$

$e^{2.8)} - 1$

14) Find the domain of the function.

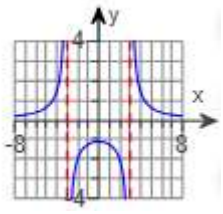
$$f(x) = \frac{x^2}{x^2 + 2}$$

Bottom does not factor

The domain is $(-\infty, \infty)$. (Type your answer in interval notation.)

15) Follow the steps for graphing a rational function to graph the function $R(x) = \frac{10}{x^2 - 9}$.

What is the domain of R(x)? $\{x | x \neq 3, -3\}$



C. The graph has y-intercept $-\frac{10}{9}$ and no x-intercept.

Set x = 0

D. There is no x-intercept.

B. The function has two vertical asymptotes. The leftmost asymptote is $x = -3$, and the rightmost asymptote is $x = 3$.

A. The function has one horizontal asymptote, $y = 0$.

Higher x exponent is in the bottom

C. There is no point at which the graph of R intersects the horizontal or oblique asymptote.

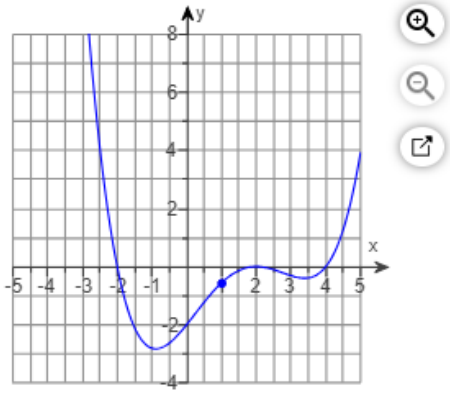
16) Suppose that $10,208 is invested at an interest rate of 6.4% per year, compounded continuously.

a) Find the exponential function that describes the amount in the account after time t, in years.
b) What is the balance after 5 years?

a) The exponential growth function is $P(t) = 10{,}208e^{0.064t}$.
(Type exponential notation with positive exponents. Do not simplify. Use integers or decimals for any numbers in the equation.)

b) The balance after 5 years is $ 14,057.72.
(Simplify your answers. Round to two decimal places as needed.)

17) In the graph below, the coordinates of the indicated point are $\left(1, -\frac{9}{16}\right)$. Construct a polynomial function that might have the given graph. (Use the smallest degree possible.)



Which of the following is a polynomial function that might have the given graph?

A. $f(x) = \frac{1}{16}(x+2)(x-2)(x-4)$

B. $f(x) = -\frac{1}{16}(x+2)(x-2)^2(x-4)$

C. $f(x) = -\frac{1}{16}(x+2)(x-2)(x-4)^2$

D. $f(x) = \frac{1}{16}(x+2)^2(x-2)(x-4)$

E. $f(x) = \frac{1}{16}(x+2)(x-2)(x-4)^2$

★ F. $f(x) = \frac{1}{16}(x+2)(x-2)^2(x-4)$

Touches at x = 2 and is positive x^4

18) Solve the equation.

$7x - (9x + 7) = 6x - 23$

$7x - 9x - 7 = 6x - 23$

$-2x - 7 = 6x - 23$

$-8x = -16$

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

★ A. The solution set is {2}. (Simplify your answer.)

B. There is no solution.