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

$\log_y x^3$

$\log_y x^3 =$ _____

2. Use properties of logarithms to expand each logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_{14}\left(\frac{14}{y}\right)$

$\log_{14}\left(\frac{14}{y}\right) =$ _____

3. Solve the polynomial inequality and graph the solution set on a real number line. Express the solution set in interval notation.

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

Use the inequality in the form $f(x) > 0$, to write the intervals determined by the boundary points as they appear from left to right on a number line.

Interval	Sign
_____	(1) _____
_____	(2) _____
_____	(3) _____

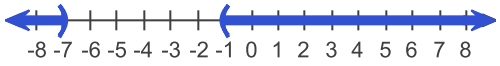
(Simplify your answers. Type your answers in interval notation. Type exact answers, using radicals as needed. Use integers or fractions for any numbers in the expressions.)

Solve the inequality. What is the solution set? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is _____.
  (Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- **B.** The solution set is the empty set.

Which number line below shows the graph of the solution set?

A.


B.


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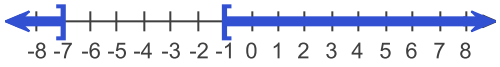

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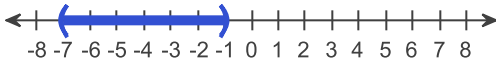

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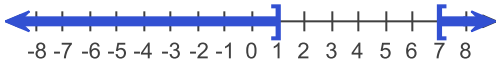

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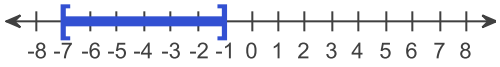

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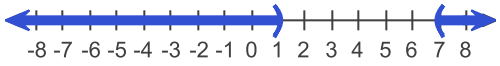

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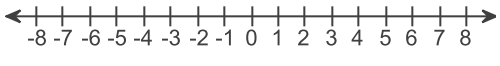


(1) negative positive (2) positive negative (3) negative positive

4. Solve the rational inequality and graph the solution set on a real number line. Express the solution set in interval notation.

$$\frac{x+4}{x-1} > 0$$

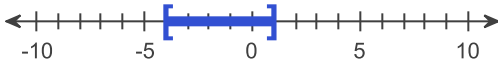
Use the inequality in the form $f(x) > 0$ to find the boundary points. Find $f(x)$.

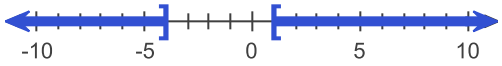
$f(x) =$ _____

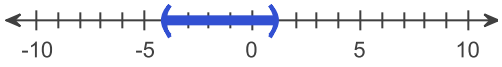
Solve the inequality. What is the solution set? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

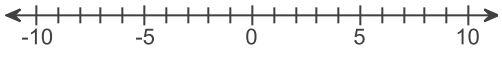
- **A.** The solution set is _____.
  (Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- **B.** The solution set is the empty set.

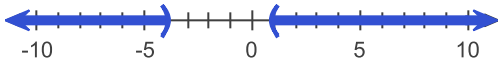
Choose the correct graph below.

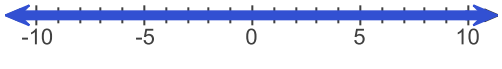
- **A.** 

- **B.** 

- **C.** 

- **D.** 

- **E.** 

- **F.** 

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

$$4^{3x-6} = 64$$

The solution set is $\{$ _____ $\}$.

6. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

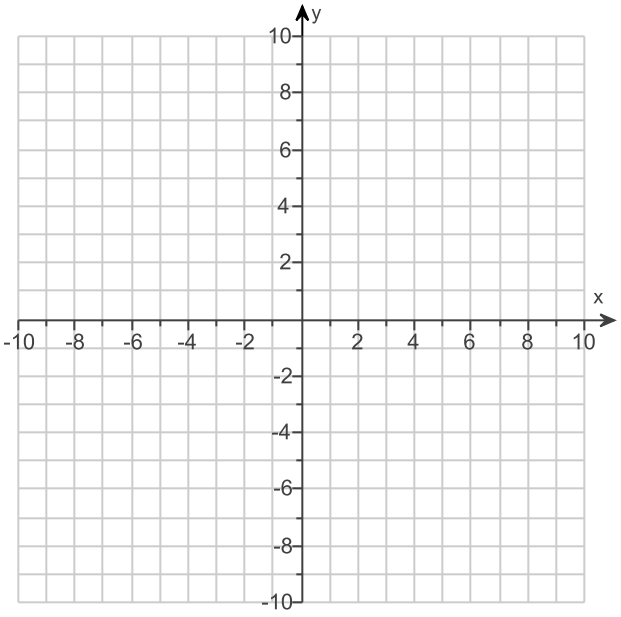
$$\log(4x-4) = \log(x+2) + \log 5$$

Solve the equation to find the solution set. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is $\{$ _____ $\}$.
  (Simplify your answer. Use a comma to separate answers as needed.)
- **B.** There are infinitely many solutions.
- **C.** There is no solution.

7. Begin by graphing $f(x) = 2^x$. Then use transformations of this graph to graph the given function. Be sure to graph and give the equation of the asymptote. Use the graph to determine the function's domain and range. If applicable, use a graphing utility to confirm your hand-drawn graphs.

$g(x) = 2^x - 6$



Graph $g(x) = 2^x - 6$ and its asymptote. Use the graphing tool to graph the function as a solid curve and the asymptote as a dashed line.

The equation of the asymptote for $g(x) = 2^x - 6$ is _____. (Type an equation.)

The domain of $g(x) = 2^x - 6$ is _____.
(Type your answer in interval notation.)

The range of $g(x) = 2^x - 6$ is _____.
(Type your answer in interval notation.)

8. Solve the polynomial inequality and graph the solution set on a real number line. Express the solution set in interval notation.

$(x - 1)(x + 7) < 0$

Use the inequality in the form $f(x) < 0$, to write the intervals determined by the boundary points as they appear from left to right on a number line.

Interval	Sign
_____	(1) _____
_____	(2) _____
_____	(3) _____

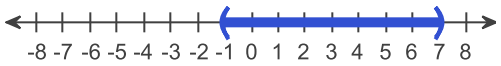
(Simplify your answers. Type your answers in interval notation. Type exact answers, using radicals as needed. Use integers or fractions for any numbers in the expressions.)

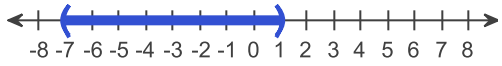
Solve the inequality. What is the solution set? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is _____.
  (Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)
- **B.** The solution set is the empty set.

Which number line below shows the graph of the solution set?

A.


B.


C.


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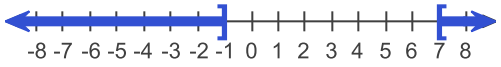
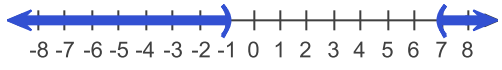
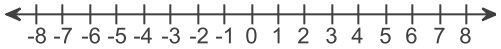


E.


F.


G.


H.


(1) negative positive (2) negative positive (3) negative positive

9. Write the equation in its equivalent exponential form.

$2 = \log_6 M$

What is the equivalent exponential form of the equation?

_____

10. Select the answers that best complete the given statement.

The power rule for logarithms states that $\log_b M^p$ = (1) _____ The logarithm of a number with an exponent is the (2) _____ of the exponent and the logarithm of that number.

(1) ○ $p \log_b M$. ○ $p + \log_b M$.

(2) ○ sum ○ product

11. Find the domain of the logarithmic function.

$f(x) = \log(12 - x)$

The domain of $f(x) = \log(12 - x)$ is _____.
(Type your answer in interval notation.)

12. Solve the given exponential equation. Express the solution set in terms of natural logarithms or common logarithms. Then use a calculator to obtain a decimal approximation for the solution.

$3e^x = 5$

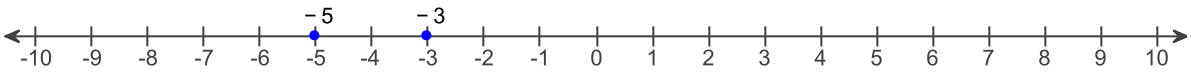
The solution set expressed in terms of logarithms is {_____}.
(Use a comma to separate answers as needed. Simplify your answer. Use integers or fractions for any numbers in the equation.)

Now use a calculator to obtain a decimal approximation for the solution.

The solution set is {_____}.
(Use a comma to separate answers as needed. Round to two decimal places as needed.)

13. State whether the following statement is true or false.

A test value for the leftmost interval on the number line shown below could be −10.



Choose the correct answer below.

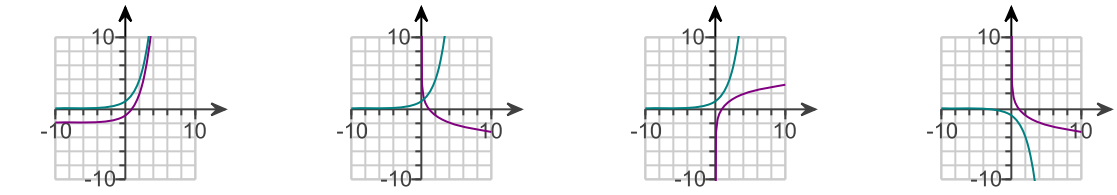
○ **A.** True, because although −10 is not the endpoint of the leftmost interval, it is from the interior of that interval.

○ **B.** True, because −10 is the endpoint of the leftmost interval.

○ **C.** False, because −10 is not the endpoint of the leftmost interval.

○ **D.** False, because −10 is not the endpoint of the leftmost interval, and it is not from the interior of that interval.

14. Graph $f(x) = 2^x$ and $g(x) = \log_2 x$ in the same rectangular coordinate system.



15. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$\log(3x + 8) - \log(x)$

$\log(3x + 8) - \log(x) =$ _____

(Type an exact answer in simplified form. Use integers or fractions for any numbers in the expression.)

16. Graph the given function by making a table of coordinates.

$f(x) = 2^x$

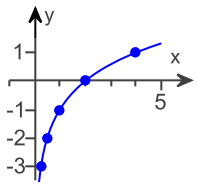
Complete the table of coordinates.

x	− 2	− 1	0	1	2
y					

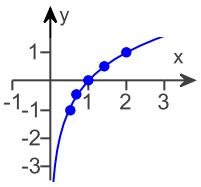
(Type integers or fractions. Simplify your answers.)

Choose the correct graph below.

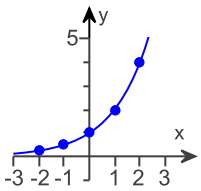
A.



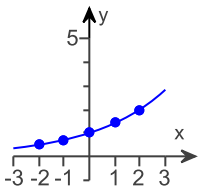
B.



C.



D.



17. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$\log_2(7x + 5) = 3$

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

A. The solution set is $\{$ _____ $\}$.
(Type an integer or a simplified fraction.)

B. There are infinitely many solutions.

C. There is no solution.

18. Write the equation in its equivalent logarithmic form.

$3^2 = 9$

What is the equivalent logarithmic form of the equation?

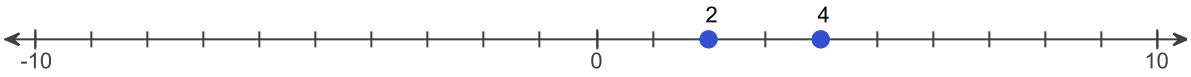
_____

19. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_b\left(\frac{x^3y}{z^9}\right)$

$\log_b\left(\frac{x^3y}{z^9}\right) =$ _____

20. The points at 2 and 4 shown on the number line below are the real solutions to the polynomial equation $x^2 - 6x + 8 = 0$ and represent the boundary points for the polynomial inequality $x^2 - 6x + 8 > 0$. The points at 2 and 4 divide the number line into which three intervals?



Choose the correct answer below.

- **A.** $(-\infty,2)$, $(2,4)$, and $(4,\infty)$
- **B.** $(-\infty,2]$, $[2,4]$, and $[4,\infty)$
- **C.** $(-\infty,4)$, $(4,2)$, and $(2,\infty)$
- **D.** $(-\infty,-4)$, $(-4,-2)$, and $(-2,\infty)$

1. $3 \log_y x$

---

2. $1 - \log_{14} y$

---

3. $(-\infty, -7)$

(1) positive

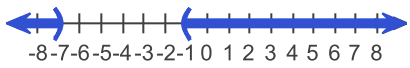
$(-7, -1)$

(2) negative

$(-1, \infty)$

(3) positive

A. The solution set is $(-\infty, -7) \cup (-1, \infty)$.
(Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

B. 

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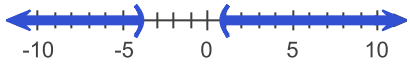
4. $\dfrac{x+4}{x-1}$

A. The solution set is $(-\infty, -4) \cup (1, \infty)$.
(Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

E. 

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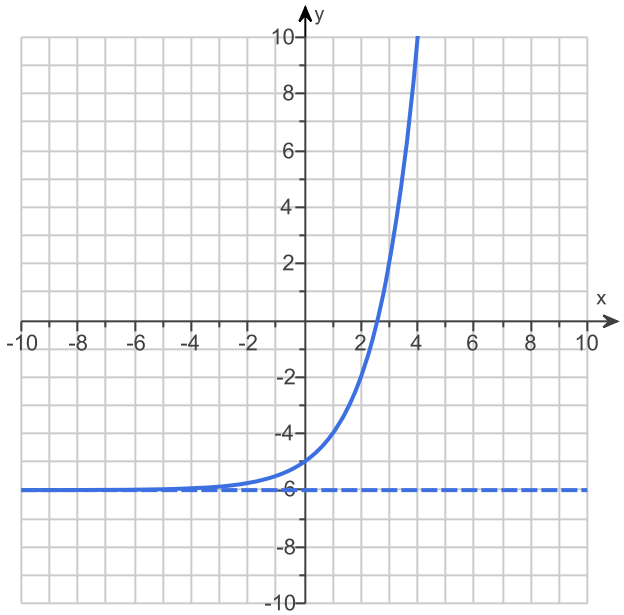
5. 3

---

6. C. There is no solution.

7.



$y = -6$

$(-\infty,\infty)$

$(-6,\infty)$

---

8. $(-\infty,-7)$

(1) positive

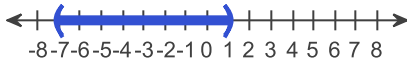
$(-7,1)$

(2) negative

$(1,\infty)$

(3) positive

A. The solution set is **$(-7,1)$** .
(Simplify your answer. Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

C. 

---

9. $6^2 = M$

---

10. (1) p **log** $_b M$.

(2) product

---

11. $(-\infty,12)$

---

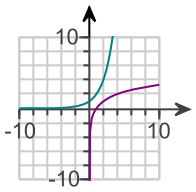
12. $\ln \frac{5}{3}$

0.51

---

13. A. True, because although -10 is not the endpoint of the leftmost interval, it is from the interior of that interval.

---

14. 

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15. $\log \frac{3x+8}{x}$

---

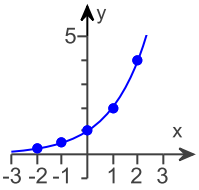
16. $\frac{1}{4}$

$\frac{1}{2}$

1

2

4

C. 

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17. A. The solution set is $\left\{ \frac{3}{7} \right\}$. (Type an integer or a simplified fraction.)

---

18. $2 = \log_3 9$

---

19. $3 \log_b x + \log_b y - 9 \log_b z$

---

20. A. $(-\infty,2)$, $(2,4)$, and $(4,\infty)$
