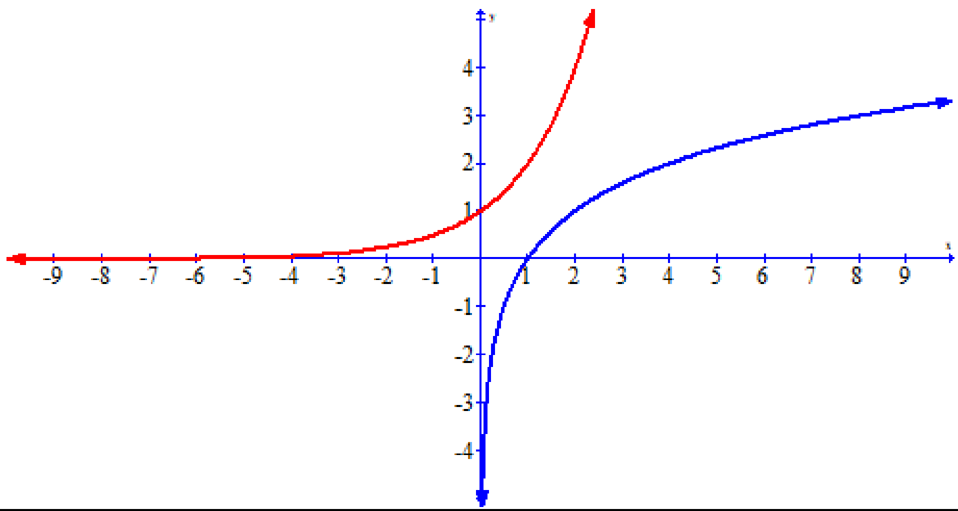
Math 30-2 Logarithmic Functions Lesson 1 Practice Questions [Solutions at end]

Use the following graph to answer the first question.

Consider the two graphs below. One is a logarithmic function and the other is an exponential function.



1. Which statement below is true?
   A) The domain of the logarithmic function is $x \geq 0$.
   B) The end behaviour of the exponential function is the curve extending from quadrant 4 to quadrant 1.
   C) The logarithmic function has a y-intercept.
   D) The exponential function has a range of $y > 0$.

Use the following information to answer the next question.

Eva was asked to convert the following equations from either exponential form to logarithmic form, or vice-versa. Analyze her answers below.

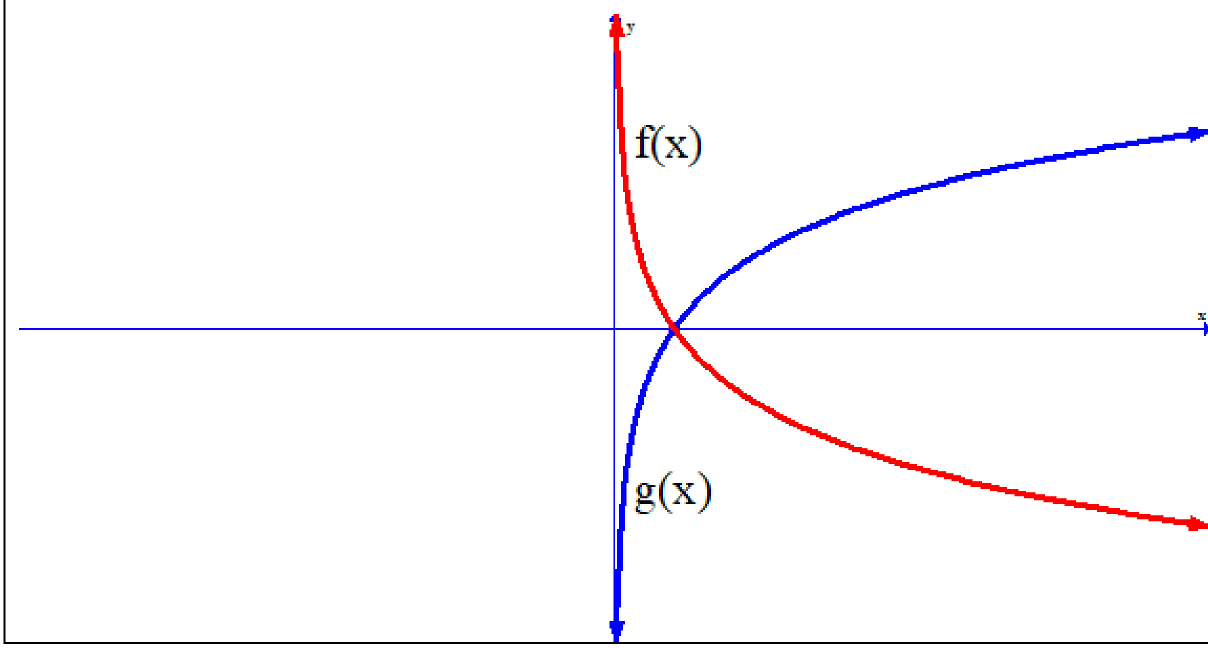
Question	Eva's Answer
1. $6^5 = 7776$	$\log_6 7776 = 5$
2. $\log_c 44 = 2$	$44^2 = c$
3. $3^{-2} = \frac{1}{9}$	$\log_{\frac{1}{9}} 3 = -2$
4. $\log_5 125 = x$	$5^x = 125$

2. Which two of Eva's answers are correct?

A) 1 and 2 B) 3 and 4 C) 1 and 4 D) 2 and 3

Use the graph below to answer the next question.

Two separate logarithmic functions are shown below. The graph of y = f(x) extends from Q 1 to Q 4. The graph of y = g(x) extends from Q 4 to Q 1.



3. Which statement below is true?

A) When written in the form $y = a \log_b x$, a possible value for a in f(x) is 2.

B) When written in the form $y = a \log_b x$, a possible value for a in g(x) is 4.

C) The range of both functions is $y > 0$.

D) The graph of g(x) has a negative y-intercept.

4. Which of the following logarithmic equations has the largest base?

A) $y = \log_e x$ B) $y = 9\log_6 x$ C) $y = 3\log x$ D) $y = \log_4 x$

5. Which of the following equations is equivalent to $8^{x+3} = 32$?

A) $\log_{(x+3)} 32 = 8$ B) $\log_{(x+3)} 8 = 32$

C) $\log_8 32 = (x + 3)$ D) $\log_8 (x + 3) = 32$

Use the following information to answer the next question.

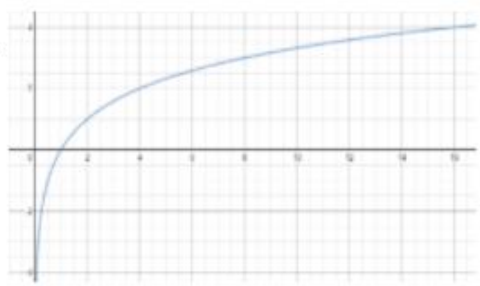
Consider the following 4 functions (A,B,C, and D), two of which are equations and two of which are graphs.

A.

B.

$y = 5(3)^n$

C.



D.

$y = (-4)\log_3 x$

Use the letters A, B, C, and D to answer the following.

6. A) The decreasing exponential function is ___.

B) The functions having a domain of $x > 0$ are _____.

C) The functions having a y-intercept are ______.

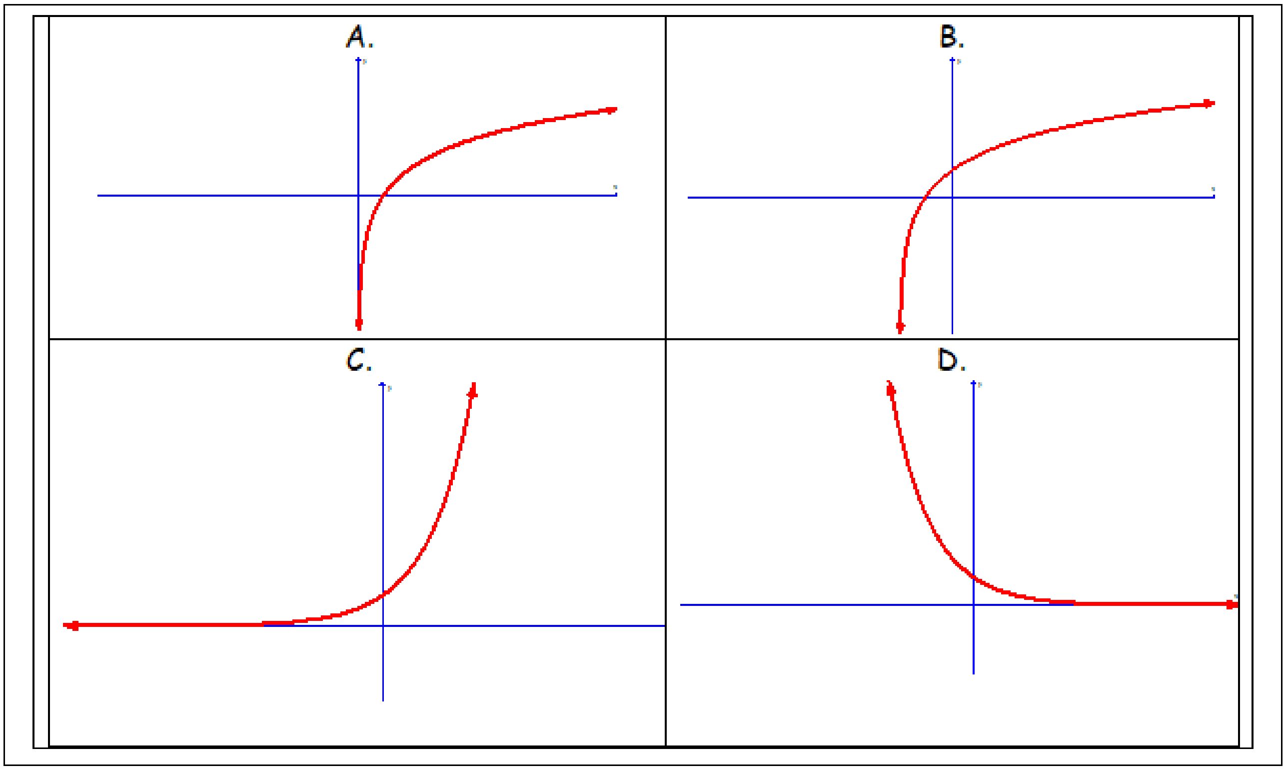
D) The increasing logarithmic function is ____.

E) The functions having a range of $y \in R$ are _____.

F) The function having an end behaviour of extending from Q 1 to Q 4 is ___.

7. The x-intercept for the graph of $y = \log_6 x$ is _____.

Use the following information to answer the next question.



8. Of the 4 graphs shown above, the graph that **cannot** be either in the form
$y = b^x$ or $y = \log_b x$ is graph _____.

9. Which of the following is **not** true for **all** logarithmic functions of the form $f(x) = \log_b x$, where $b > 0$ and $b \neq 1$?

A) The range is $y \in R$.

B) The x-intercept is 1.

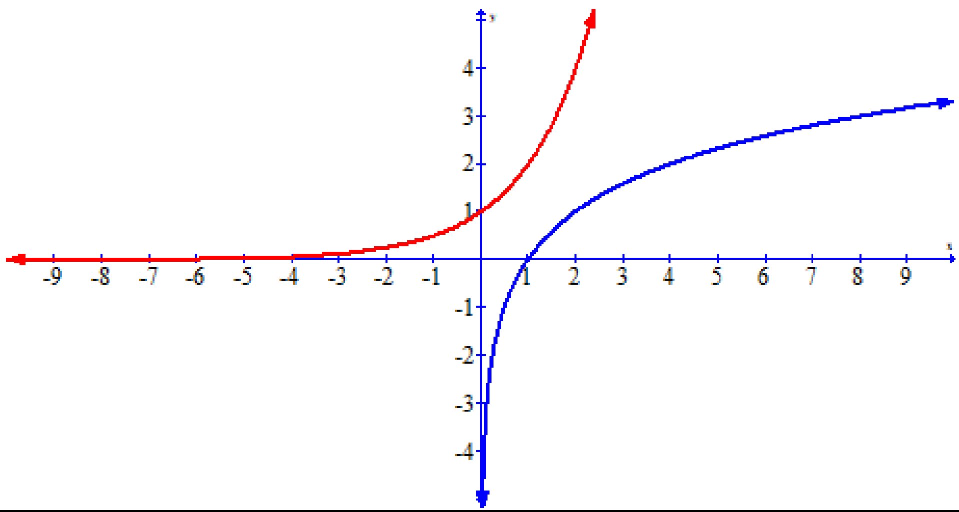
C) The domain is $\{x \mid x \geq 0, x \in R\}$

D) There is no y-intercept.

<u>Math 30-2 Logarithmic Functions Lesson 1 Practice Questions</u><u>Solutions</u>

Use the following graph to answer the first question.

Consider the two graphs below. One is a logarithmic function and the other is an exponential function.



1. Which statement below is true?

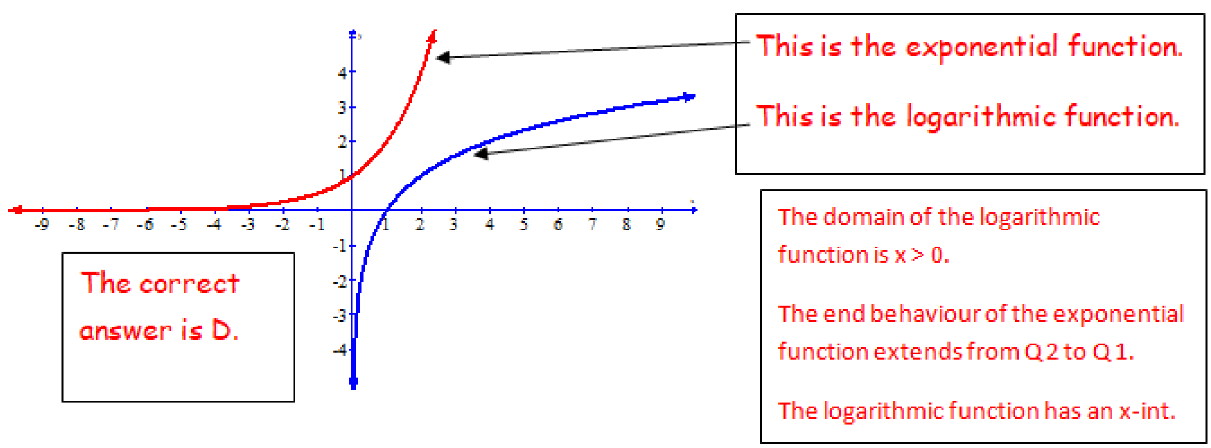
A) The domain of the logarithmic function is $x \geq 0$.

B) The end behaviour of the exponential function is the curve extending from quadrant 4 to quadrant 1.

C) The logarithmic function has a y-intercept.

D) The exponential function has a range of $y > 0$.

Solution



Use the following information to answer the next question.

Eva was asked to convert the following equations from either exponential form to logarithmic form, or vice-versa. Analyze her answers below.

Question	Eva's Answer
1. $6^5 = 7776$	$\log_6 7776 = 5$
2. $\log_c 44 = 2$	$44^2 = c$
3. $3^{-2} = \frac{1}{9}$	$\log_{\frac{1}{9}} 3 = -2$
4. $\log_5 125 = x$	$5^x = 125$

2. Which two of Eva's answers are correct?

A) 1 and 2 B) 3 and 4 C) 1 and 4 D) 2 and 3

Solution

Number 1 is correct.

Number 2 should be $c^2 = 44$.

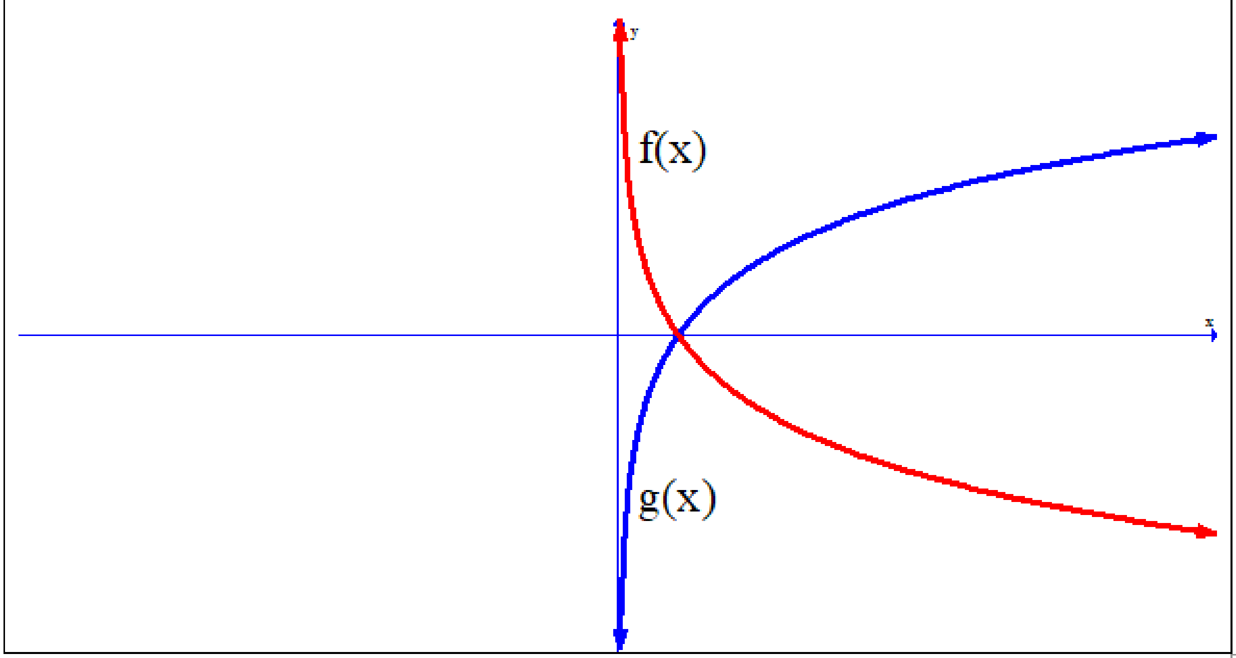
Number 3 should be $\log_3\left(\frac{1}{9}\right) = -2$

Number 4 is correct.

The correct answer is C.

Use the graph below to answer the next question.

Two separate logarithmic functions are shown below. The graph of y = f(x) extends from Q 1 to Q 4. The graph of y = g(x) extends from Q 4 to Q 1.



3. Which statement below is true?
   A) When written in the form $y = a \log_b x$, a possible value for a in f(x) is 2.
   B) When written in the form $y = a \log_b x$, a possible value for a in g(x) is 4.
   C) The range of both functions is $y > 0$.
   D) The graph of g(x) has a negative y-intercept.

Solution

The graph of f(x) is an example of a decreasing logarithmic function. When written in the form $y = a \log_b x$, the value of a must be less than zero. Therefore a value of 2 for a in f(x) is not possible.

The graph of g(x) is an example of a increasing logarithmic function. When written in the form $y = a \log_b x$, the value of a must be greater than zero. Therefore a value of 4 for a in g(x) is possible.

The range of both graphs is the set of real numbers.

Although the graph of $g(x)$ gets very close to the y-axis, in theory, it never touches it. Therefore, both graphs do not have a y-intercept.

The correct answer is B.

4. Which of the following logarithmic equations has the largest base?

   A) $y = \log_e x$ B) $y = 9 \log_6 x$ C) $y = 3\log x$ D) $y = \log_4 x$

Solution

When written in the form $y = a \log_b x$, the small subscripted number, b, is the base.

For option A) $y = \log_e x$, the base is e, indicating a natural logarithm. The value of e is 2.718…

For option B) $y = 9 \log_6 x$, the value of the base is 6.

For option C) $y = 3\log x$, when there is no small subscripted number written, the implication is that we are dealing with a common logarithm, which is base 10.

For option D) $y = \log_4 x$, the value of the base is 4.

The correct answer is C.

5. Which of the following equations is equivalent to $8^{x+3} = 32$?

   A) $\log_{(x+3)} 32 = 8$ B) $\log_{(x+3)} 8 = 32$

   C) $\log_8 32 = (x + 3)$ D) $\log_8 (x + 3) = 32$

Solution

Recall that the base in exponential form and logarithmic form is the same. When writing an equation in logarithmic form, the base is the small subscripted number. Since the base is 8 in the exponential form, the base is 8 in the logarithmic form. Options A and B can be eliminated.

Recall that a logarithm is an exponent. The exponent in exponential form is (x + 3). Therefore, (x + 3) must be on the right side of the equal sign (opposite the log).

The correct answer C.

Use the following information to answer the next question.

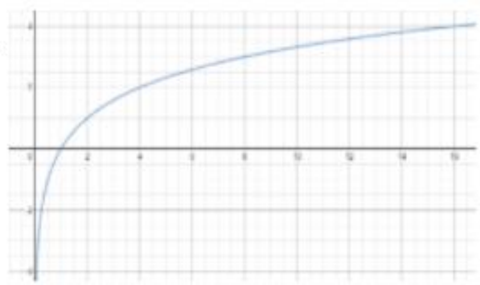
Consider the following 4 functions (A,B,C, and D), two of which are equations and two of which are graphs.

A.

B.

$y = 5(3)^n$

C.



D.

$y = (-4)\log_3 x$

Use the letters A, B, C, D or N(none of these) to answer the following.

6. A) The decreasing exponential function is _N_.
   B) The functions having a domain of x > 0 are __C&D__.
   C) The functions having a y-intercept are __A&B___.
   D) The increasing logarithmic function is _C__.
   E) The functions having a range of y Є R are __C&D___.
   F) The function having an end behaviour of extending from Q 1 to Q 4 is _D_.

Solution

The two exponential functions are A and B. They both have a *b* value greater than 1, so they are both increasing.

The two logarithmic functions are C and D. Their domain is x > 0.

The logarithmic functions C and D will not have a y-intercept, but the two exponential functions, A and B, will have a y-intercept. The y-intercept is the value of *a*, in the form, $y = a(b)^x$.

The increasing logarithmic function is C. It extends from Q4 to Q1. It is considered to be increasing because as the x values increase, the y values also increase.

The two logarithmic functions, C and D, have a range of $y \in R$. The range for the exponential functions is $y > 0$.

Because the leading coefficient of the logarithmic function in D is negative (-4), this indicates a decreasing logarithmic function, which has an end behaviour of extending from Q1 to Q 4.

7. The x-intercept for the graph of $y = \log_6 x$ is _1_.

Solution

To find an x-intercept, set y = 0 and solve for x.

$0 = \log_6 x$

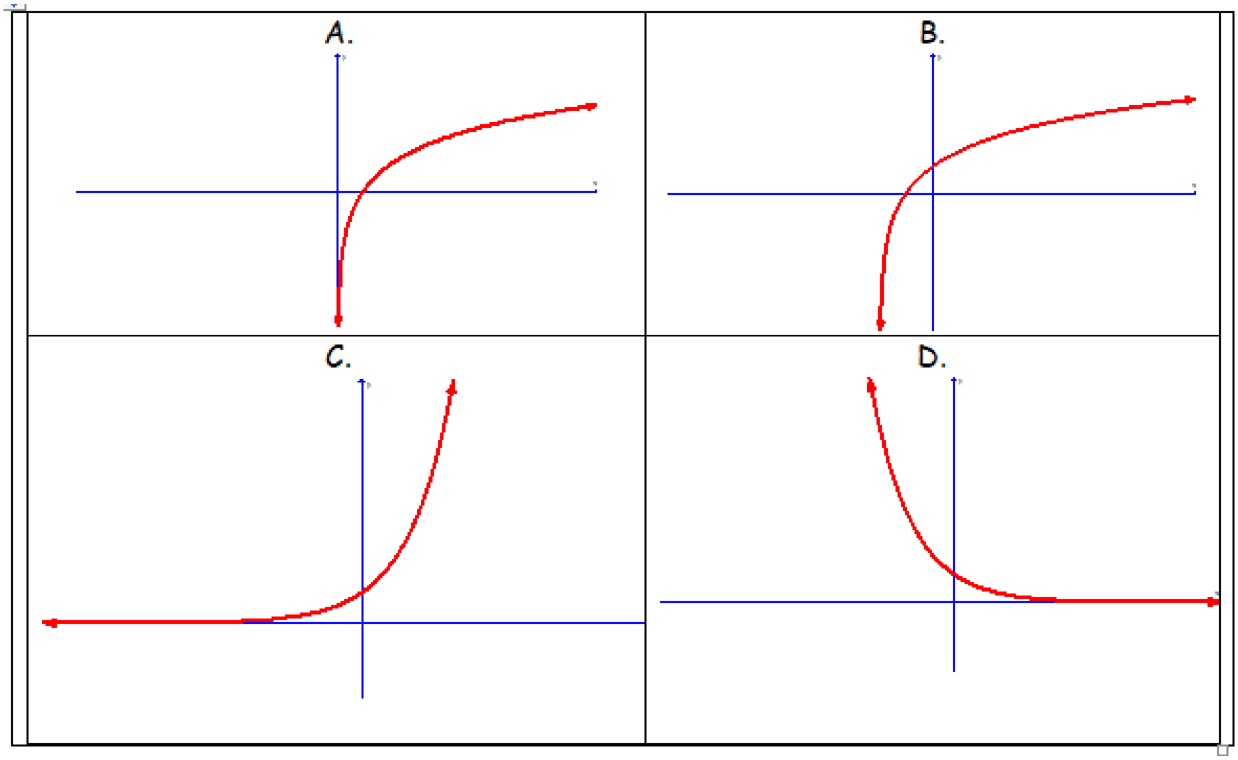
Convert to exponential form.

$6^0 = x$

Any base raised to an exponent of 0 is 1.

The x-intercept is 1.

Use the following information to answer the next question.



8. Of the 4 graphs shown above, the graph that **cannot** be either in the form $y = b^x$ or $y = \log_b x$ is graph __B__.

Solution

Exponential graphs, which are of the form, $y = b^x$, have a domain of $x \in R$ and a range of $y > 0$. The exponential graphs above, C and D, both have these as their domain and range. Therefore, both of these graphs can be in the form $y = b^x$.

Logarithmic graphs, which are of the form, $y = \log_b x$, have a domain of $x > 0$ and a range of $y \in R$. Of the two logarithmic graphs above, A and B, only graph A displays these characteristics. In graph B, a part of the graph (that which is to the left of the x-axis) displays negative x values. Since the domain must be $x > 0$ to be of the form $y = \log_b x$, B cannot be in this form.

Of the 4 graphs shown above, the graph that cannot be either in the form

$y = b^x$ or $y = \log_b x$ is graph __B__.

9. Which of the following is **not** true for **all** logarithmic functions of the form $f(x) = \log_b x$, where $b > 0$ and $b \neq 1$?
   A) The range is $y \in R$.
   B) The x-intercept is 1.
   C) The domain is $\{x \mid x \geq 0, x \in R\}$
   D) There is no y-intercept.

Solution

Answers A, B, and D are true of all logarithmic functions in this form.

The domain is $\{x \mid x > 0, x \in R\}$ [GREATER THAN, **NOT** GREATER THAN OR EQUAL TO]