Understanding Natural Logarithms Practice

Use the following information to answer the first question.

Given ln(x), consider the following statements. This means that we must determine

Statement 1	what exponent with a base of x will result in a value of e.
Statement 2	what exponent with a base of e will result in a value of x.
Statement 3	what is the value of e raised to an exponent of x.
Statement 4	what is the value of x raised to an exponent of e.

1. The correct statement is

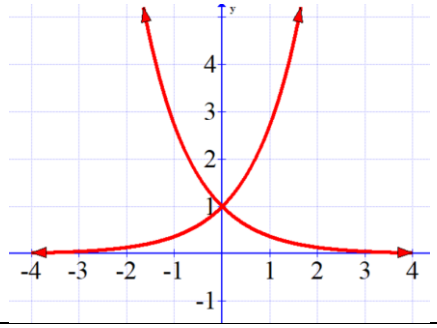
   A) 1 B) 2 C) 3 D) 4

2. Given $y = e^x$, if $x = 5$, then the value of y, to the nearest integer is _____.

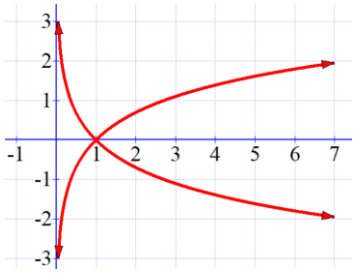
Use the following information to answer the next question.

Consider the 4 graphs below.

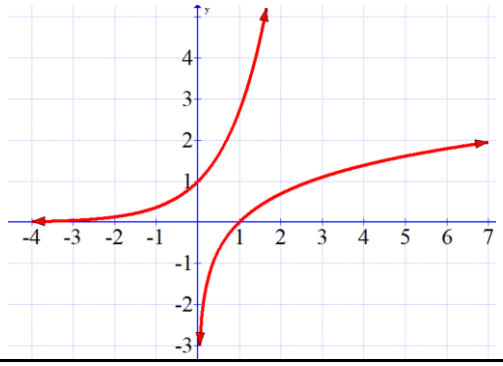
A.



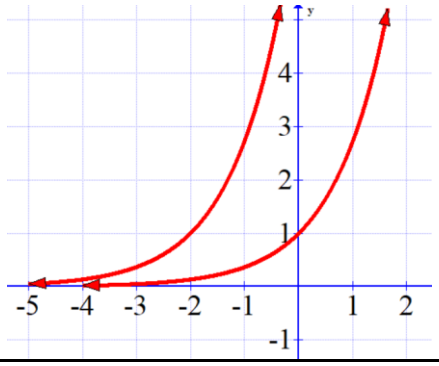
B.



C.



D.



3. Since $y = e^x$ and $y = \ln(x)$ are inverses of each other, the graph correctly depicting this relationship is

   A) A B) B C) C D) D

4. The correct statement is

   A) $\ln(42) = 1.623\ldots$, because $e^{(1.6223\ldots)} = 42$.
   B) $\ln(42) = 1.623\ldots$, because $e^{42} = 1.623\ldots$
   C) $\ln(42) = 3.737\ldots$, because $e^{42} = 3.737\ldots$
   D) $\ln(42) = 3.737\ldots$, because $e^{(3.737\ldots)} = 42$.

5. If $\ln(x) = 5.6$, then the value of x to the nearest integer is _____.

6. A) When you input ln(e) into your calculator, the value is stated as 1. Explain.

   B) When you input ln(1) into your calculator, the value is stated as 0. Explain.

Understanding Natural Logarithms Practice Solutions

Use the following information to answer the first question.

Given ln(x), consider the following statements. This means that we must determine

Statement 1	what exponent with a base of x will result in a value of e.
Statement 2	what exponent with a base of e will result in a value of x.
Statement 3	what is the value of e raised to an exponent of x.
Statement 4	what is the value of x raised to an exponent of e.

1. The correct statement is

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

Solution

ln(x) is the same as $\log_e(x)$.

Given the logarithmic equation, $y = \log_e(x)$, we can convert to exponential form, which would be $e^y = x$. Remember that a logarithm is an exponent.

Thus, we are determining what exponent with a base of e will result in a value of x.

The correct answer is B.

2. Given $y = e^x$, if x = 5, then the value of y, to the nearest integer is _148_.

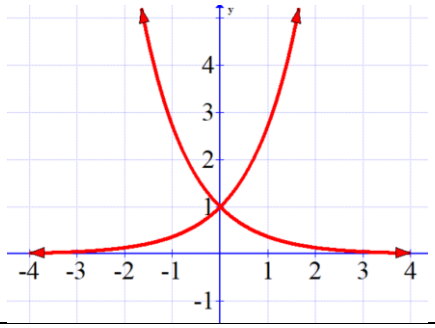
Solution

Using the calculator, $e^5 = 148.413\ldots$ The closest integer is 148.

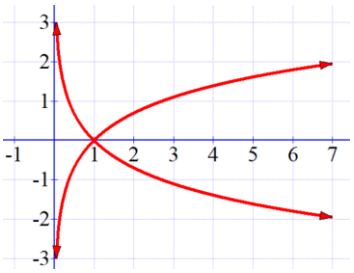
Use the following information to answer the next question.

Consider the 4 graphs below.

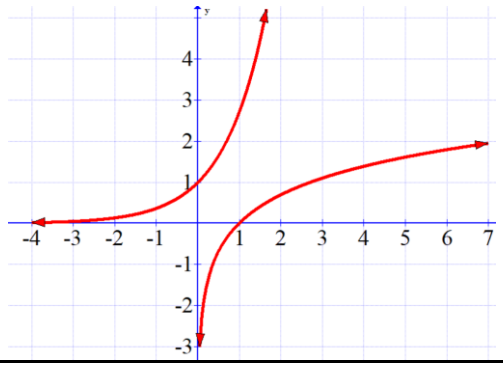
A.



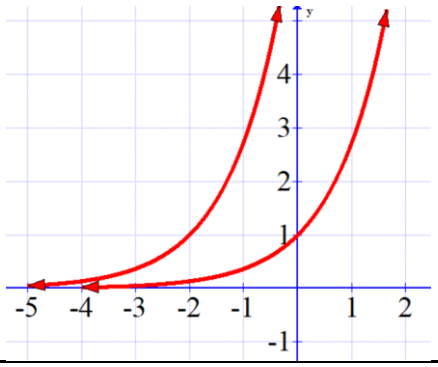
B.



C.



D.

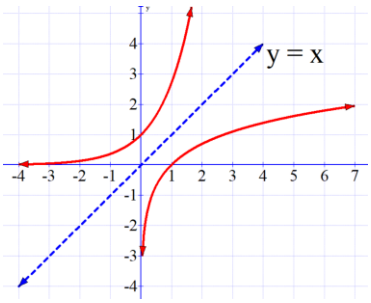


3. Since $y = e^x$ and $y = \ln(x)$ are inverses of each other, the graph correctly depicting this relationship is

A) A B) B C) C D) D

Solution

The graph of a function and its inverse are reflections in the line y = x. The x and y coordinates of inverse functions are interchanged; in other words, (x,y) is transformed to (y,x).



The correct answer is C.

4. The correct statement is

   A) $\ln(42) = 1.623\ldots$, because $e^{(1.6223\ldots)} = 42$.
   B) $\ln(42) = 1.623\ldots$, because $e^{42} = 1.623\ldots$
   C) $\ln(42) = 3.737\ldots$, because $e^{42} = 3.737\ldots$
   D) $\ln(42) = 3.737\ldots$, because $e^{(3.737\ldots)} = 42$.

Solution

Given $\ln(42)$, this is the natural logarithm with base e, that can also be written as $y = \log_e(42)$. In exponential form, this would be $e^y = 42$. The calculator will tell us that $\ln(42) = 3.737\ldots$

The correct answer is D.

5. If $\ln(x) = 5.6$, then the value of x to the nearest integer is _270_.

Solution

When writing this question in exponential form, we have $e^{5.6} = x$. Using the calculator, $e^{5.6} = 270.426\ldots$

The value of x to the nearest integer is 270.

6. A) When you input $\ln(e)$ into your calculator, the value is stated as 1. Explain.

Solution

We can think of $\ln(e)$ in equation form as $y = \ln(e)$, or $y = \log_e(e)$. Recalling that a logarithm is an exponent, we are trying to find what exponent, raised to a base of e, is equal to e. In other words, $e^y = e^1$. Since the bases are the same, the exponents must also be the same; $y = 1$. Thus, $\ln(e) = 1$.

   B) When you input $\ln(1)$ into your calculator, the value is stated as 0. Explain.

Solution

We can think of $\ln(1)$ in equation form as $y = \ln(1)$, or $y = \log_e(1)$. Recalling that a logarithm is an exponent, we are trying to find what exponent, raised to a base of e, is equal to 1. In other words, $e^y = 1$. Any base raised to an exponent of zero is equal to 1; $y = 0$. Thus, $\ln(1) = 0$.