Bellwork

Evaluate each without using a calculator.

\[ \log_6 6^4 \quad 4^{3/2} \]

\[ \ln e^{-2} \quad \log 10000 \]
Homework Answers

1) \( x = 3 \)  
10) \( x = 2 \)  
24) \( x = 3 \)

2) \( x = 1 \)  
11) \( \log 5275 = 3.72 \)

3) \( x = -2 \)  

4) Skip  
12) \( x = -14 \)

5) \( x = 2 \)  
17) \( \log 635 = 2.8 \)

6) \( x = 3 \)  
18) \( \frac{\ln 2}{\ln 7} = 0.356 \)

7) \( x = 4 \)  

8) \( x = -2 \)  
19) \( \ln -6 = \text{nosolution} \)

9) \( \log 42 = 1.623 \)  
21) \( \ln 8 = 2.079 \)
Unit 3
Exponential and Logarithmic Functions

Section 3.2
Graphs of Logarithmic Functions

Objective: SWBAT graph logarithms.
Graphs of Logarithmic Functions

Graphing Logs general Form: \( y = a \log_b x \)

VA: \( x = 0 \)

Shifting with logs: \( y = a \log_b (x - h) + k \)

VA: \( x = h \)
Graphs of Logarithmic Functions

The inverse of \( f(x) = b^x \) is \( f^{-1}(x) = \log_b x \)

exponential function

logarithmic function

To graph a logarithmic function \( \log_b x \), first graph its inverse \( b^x \), then reflect the graph.
Graph: \[ f(x) = \log_3 x; \quad g(x) = \log_3 (x + 1) \]

Step 1: graph \[ f(x) = 3^x \] using a table of values.

Step 2: graph \[ y = x \] (the reflection line).

Step 3: graph \[ f^{-1}(x) = \log_3 x \] by switching the x and y values in the table.

Step 4: Shift reflected graph according to the transformations.
Graph: \( f(x) = \ln x; \quad g(x) = \ln(x) - 4 \)

Step 1: graph \( f(x) = e^x \) using a table of values

Step 2: graph \( y = x \) (the reflection line)

Step 3: graph \( f^{-1}(x) = \ln x \) by switching the x and y values in the table.

Step 4: Shift reflected graph according to transformations.
Graph: \( f(x) = \log_5 x; \quad g(x) = \log_5 (x - 3) - 2 \)

Step 1: graph \( f(x) = 5^x \) using a table of values

Step 2: graph \( y = x \) (the reflection line)

Step 3: graph \( f^{-1}(x) = \log_5 x \) by switching the x and y values in the table.

Step 4: Shift reflected graph according to the transformations.
Pre Poster work...

This activity is to be done with a partner. Each person will make their own poster.

You will be given a card with 2 functions, f(x) & g(x)

• Practice graphing the functions of a piece of paper.
  – Show all work including your table of values
  – Decide how to number the coordinate plane to fit your function
• Graph y = x
• **State Domain, Range and Asymptotes for each**
• Tell how your 2 functions are related.
Poster...

This activity is to be done with a partner. Each person will make their own poster.

You will be given a card with 2 functions, \( f(x) \) & \( g(x) \)

- Draw the coordinate plane in a dark color
- Graph \( y = x \) (with a green dotted line)
- Graph the functions. (each in a different color)
- Identify each function and label 2 points on each
- State Domain, Range and Asymptotes for each
- Explain how your 2 functions are related
- Poster should be correct and neatly done
Coursework:

Graph and List the domain, range and VA for each

1) \( f(x) = \log_4(x - 3) + 2 \)
2) \( f(x) = \log_3(x + 5) - 3 \)
3) \( f(x) = \log_{1/2}(x) + 4 \)
4) \( f(x) = \ln(x - 2) \)

Homework Quiz NEXT class!!
\[ f(x) = 2^x \quad g(x) = \log_2x \]
\[ f(x) = 3^x \quad g(x) = \log_3x \]
\[ f(x) = 4^x \quad g(x) = \log_4x \]
\[ f(x) = 5^x \quad g(x) = \log_5x \]
\[ f(x) = 6^x \quad g(x) = \log_6x \]
\[ f(x) = 7^x \quad g(x) = \log_7 x \]
\[ f(x) = 8^x \quad g(x) = \log_8 x \]
\[ f(x) = 1/2^x \quad g(x) = \log_{1/2} x \]
\[ f(x) = 1/3^x \quad g(x) = \log_{1/3} x \]
\[ f(x) = 1/4^x \quad g(x) = \log_{1/4} x \]
\[ f(x) = \frac{1}{5^x} \quad g(x) = \log_{\frac{1}{5}} x \]

\[ f(x) = \frac{1}{6^x} \quad g(x) = \log_{\frac{1}{6}} x \]

\[ f(x) = \frac{1}{8^x} \quad g(x) = \log_{\frac{1}{8}} x \]

\[ f(x) = 9^x \quad g(x) = \log_9 x \]

\[ f(x) = 10^x \quad g(x) = \log_{10} x \]