7.4 Logarithmic Functions Notes

Algebra II

Graph \( f(x) = 2^x \)

Type of Function: Is \( f^{-1}(x) \) a function?

Domain of \( f(x) \): Domain of \( f^{-1}(x) \):

Range of \( f(x) \): Range of \( f^{-1}(x) \):

Inverse of \( f(x) \): Graph \( f \) and \( f^{-1}(x) \):

Definitions:

Logarithm of \( y \) with base \( b \):

Common logarithm:

Natural logarithm:

Rewriting Logarithmic Equations

General: \( \log_b y = x \) if and only if \( b^x = y \)

<table>
<thead>
<tr>
<th>Logarithmic Form</th>
<th>Exponential Form</th>
<th>Exponential Form</th>
<th>Logarithmic Form</th>
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</thead>
<tbody>
<tr>
<td>( \log_2 32 )</td>
<td>( 2^3 = 8 )</td>
<td></td>
<td></td>
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<tr>
<td>( \log_{10} 1 )</td>
<td>( 5^0 = 1 )</td>
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<tr>
<td>( \log_9 9 )</td>
<td>( 7^1 = 1 )</td>
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<tr>
<td>( \log_{1/3} 25 )</td>
<td></td>
<td>( \left(\frac{1}{3}\right)^{-1} = 3 )</td>
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**Properties and Special Logarithms:**

<table>
<thead>
<tr>
<th>Log of 1</th>
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<tbody>
<tr>
<td>Log of b with base b</td>
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<tr>
<td>Common Log</td>
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<tr>
<td>Natural Log</td>
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**Evaluate the logarithm:** *Ask yourself: “b raised to what power gives you y?”*

A) \( \log_3 81 \)  
B) \( \log_{1/4} 256 \)  
C) \( \log_{10} 0.001 \)  
D) \( \log_8 2 \)  
E) \( \log_5 \frac{1}{25} \)

**Inverses**

If \( f(x) \) and \( g(x) \) are inverses, then ________________

Therefore, since Logarithmic functions and Exponential functions are inverses:

*Blank*  

Find the Inverse:

A) \( y = 10^x \)  
B) \( y = \ln(x - 5) \)  
C) \( y = \log_4(x - 2) + 1 \)