Chapter 10 [Inverse Functions/Exponentials/Logarithms] Quiz

Answer problems and express your answers appropriately, that is; simply state answers to simplification/evaluation problems as expressions, and express solutions to equations in solution set notation. **ALL WORK MUST BE SHOWN!**

1. If it exists (that is, if the original function is “one-to-one”), find the inverse function to the following function and then simultaneously graph (on the graph paper provided) them both on the same set of axes. Also graph the line \( y = x \) to show the symmetry. [If it does not exist, give at least one pair of points at which the original function violates the horizontal line test.]

\[
g(x) = (x + 2)^2, \quad x \geq -2
\]

2. Simultaneously (on the same set of axes), graph (on the graph paper provided) the following functions, \( f(x) \) and \( g(x) \):

Use the following T-tables to help you with the plotting of points. Note any symmetry, and from these observations, can you conclude anything about the relationship between these functions? Note this in the CLAIM section on the next page.

\[
f(x) = 2^x \quad \text{and} \quad g(x) = \log_2 x
\]

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
<th>( x )</th>
<th>( g(x) )</th>
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<tbody>
<tr>
<td>-2</td>
<td>1</td>
<td>1/4</td>
<td>5</td>
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<tr>
<td>-1</td>
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3. **Substantiate** your claim in problem # 2, by using both the following facts about inverse functions: \( f(f^{-1}(x)) = x \) and \( f^{-1}(f(x)) = x \)

4. **Evaluate/Simplify** the following (2 points for each sub-problem):

   a) \( \log_9(9) \)   
   
   b) \( \log_{11}(\frac{1}{121}) \)   
   
   c) \( \frac{\log_5(81)}{3} \)   
   
   d) \( \log_5(\frac{125}{625}) \)   
   
   e) \( \log_{216}(6) \)
5. Use logarithms and the change of base formula to **solve** the following exponential equations (5 points for each sub-problem). Don’t forget to use solution set notation.

a) \(12^x = 8\)  
   (round your answer to the nearest thousandth)

b) \(200e^{-0.02t} = 100\)  
   (round your answer to the nearest tenth)