1. [14 points] Figure 1 below gives some data for an invertible function \( f(x) \) and Figure 2 shows the graph of a function \( g(x) \). Use this information to answer the questions below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 1

a. [4 points]

i. Evaluate \( 2g(2) \).

**Solution:** From the graph, we see that \( g(2) = 3 \).
So \( 2g(2) = 2(3) = 6 \).

**Answer:** 6

ii. Evaluate \( f^{-1}(5) \).

**Solution:** From the table, we see that \( f(1) = 5 \). So \( f^{-1}(5) = 1 \).

**Answer:** 1

iii. Evaluate \( f(f(1)) \).

**Solution:** From the table, we see that \( f(1) = 5 \).
So \( f(f(1)) = f(5) = 4 \).

**Answer:** 4

iv. Solve \( f(x) = g(3) \) for \( x \).

**Solution:** From the graph we see that \( g(3) = 4 \). So we are to solve \( f(x) = 4 \). From the table, we see that the solution is \( x = 5 \).

**Answer:** \( x = 5 \)

b. [3 points] Which of the following numbers are in the **range of** \( g \)?

(Circle ALL correct answers.)

0 1 1.5 \( \pi \) 4 5 5.25 7 8 9

c. [7 points] Find a formula for \( g(x) \) as a piecewise-defined function.

**Solution:** The first piece appears to be linear with slope \(-0.5\) and vertical intercept 1 so on this piece, \( g(x) = 1 - 0.5x \). The second piece appears to be linear with slope 1 and vertical intercept 1, so on this piece, \( g(x) = 1 + x \). The third piece appears to be linear with slope \( \frac{3}{4} \), so using the point \((4, 1)\) and point-slope form, a formula for this piece is \( g(x) = 1 + 0.75(x - 4) = -2 + 0.75x \). Hence a formula for \( g(x) \) is

\[
g(x) = \begin{cases} 
1 - 0.5x & \text{if } 0 \leq x < 2 \\
1 + x & \text{if } 2 \leq x < 4 \\
-2 + 0.75x & \text{if } 4 < x < 8 
\end{cases}
\]