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.

x	0	1	2	3	4	5	6
$f(x)$	1	5	8	9	7	4	0

Figure 1

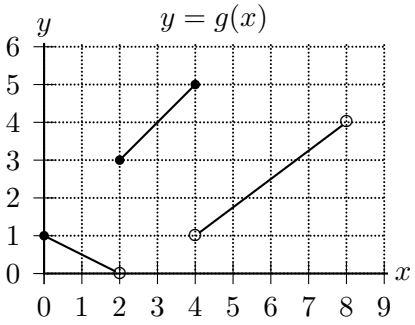

Figure 2

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 $\boxed{1}$ $\boxed{1.5}$ $\boxed{\pi}$ $\boxed{4}$ $\boxed{5}$ 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 $3/4$, 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

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