1. [21 points] Consider \( h(w) \), a function with domain \([-7, 6]\), with values given in the table below.

\[
\begin{array}{c|cccccc}
  w & -7 & -5 & -2 & 0 & 2 & 6 \\
  h(w) & 20 & 10 & 1 & -3 & -5 & -7 \\
\end{array}
\]

Consider the piecewise function

\[
j(x) = \begin{cases} 
2x + 9 & \text{for } -7 \leq x < -2 \\
20 \cdot 2^x & \text{for } -2 \leq x \leq 6.
\end{cases}
\]

Finally, consider the function \( p(t) \) with graph:

![Graph of p(t)](image)

a. [5 points] Circle all of the following statements that COULD be true. Circle the whole statement. Any unclear marks will be marked incorrect.

- \( h(w) \) is invertible.
- \( h(w) \) is concave down.
- \( h(w) \) is exponential.
- \( h(w) \) is increasing.
- \( h(w) \) is decreasing.
- \( h(w) \) is linear.
- \( h(w) \) has two horizontal intercepts.
- \( h(w) \) has a positive vertical intercept.

b. [4 points] Find the domain of \( p(t) \) and the range of \( j(x) \). Express your answer in interval notation or using inequalities.

The domain of \( p(t) \) is ________________________________

The range of \( j(x) \) is ________________________________

c. [4 points] Calculate the following or write “UNDEFINED” if the quantity is not defined. Simplify your answer.

(i) \( j(2) = \) ________________________________
(ii) \( (2p(2) - 1)^2 = \) ________________________________
(iii) \( j(h(2)) = \) ________________________________
(iv) \( p(j(-4)) = \) ________________________________
1. (continued) The information given on the previous page is given again here for your convenience:
Consider \( h(w) \), a function with domain \([-7, 6]\), with values given in the table below.

<table>
<thead>
<tr>
<th>( w )</th>
<th>-7</th>
<th>-5</th>
<th>-2</th>
<th>0</th>
<th>2</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>( h(w) )</td>
<td>20</td>
<td>10</td>
<td>1</td>
<td>-3</td>
<td>-5</td>
<td>-7</td>
</tr>
</tbody>
</table>

Consider the piecewise function

\[
j(x) = \begin{cases} 
2x + 9 & \text{for } -7 \leq x < -2 \\
20 \cdot 2^x & \text{for } -2 \leq x \leq 6.
\end{cases}
\]

Finally, consider the function \( p(t) \) with graph:

\[
\begin{array}{c}
\begin{array}{c}
\begin{array}{cccccccc}
\text{t} & -6 & -5 & -4 & -3 & -2 & -1 & 1 & 2 & 3 & 4 & 5 & 6 \\
\text{p(t)} & 3 & 2 & 1 & 1 & 2 & 3 & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} \end{array}
\end{array}
\end{array}
\]

\[d. \text{[4 points]} \] Carefully sketch a graph of \( p(t - 2) - 1 \) on the axes below. Be sure to make the coordinates of all endpoints of the function clear.

\[
\begin{array}{c}
\begin{array}{c}
\begin{array}{cccccccc}
\text{t} & -6 & -5 & -4 & -3 & -2 & -1 & 1 & 2 & 3 & 4 & 5 & 6 \\
\text{p(t)} & 3 & 2 & 1 & 1 & 2 & 3 & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} \end{array}
\end{array}
\end{array}
\]

\[e. \text{[4 points]} \] Find all solutions to each of the equations below. Simplify your answers, but leave them in exact form. If an equation has no solution, write “NO SOLUTION” in the blank.

(i) \( j(h(w)) = -5 \).

\( w = \) ____________

(ii) \( p(t) = 1 \).

\( t = \) ____________