1. [10 points] Given below are three functions. \( r(w) \) is given by a graph, \( h(t) \) is given by a formula, and \( n(v) \) is described verbally.

\( n(v) \) has a constant rate of change, and its graph passes through the points \((1, 4)\) and \((3, 0)\).

\[ h(t) = \sqrt{t - 4}. \]

The function \( r(w) \) is linear on \([-2, 0]\) and on \([2, 4]\). Give your answer in exact form (i.e. no decimal approximations) for parts a.-c.

a. [2 points] Complete the sentence by filling in the blank. You can express your answer in inequality or interval notation.

The domain of \( h(t) \) is \([4, \infty)\).

b. [2 points] Complete the sentence by filling in the blank. You can express your answer in inequality or interval notation.

The range of \( r(w) \) is \([1, 4]\).

c. [2 points] Complete the sentence by filling in the blank.

The average rate of change of \( h(t) \) between \( t = 6 \) and \( t = 9 \) is \( \frac{\sqrt{9} - 4 - \sqrt{6} - 4}{9 - 6} = \frac{\sqrt{5} - \sqrt{2}}{3} \).

d. [4 points] Find all solutions to the equation

\( n(r(w)) = -2. \)

If there is no solution, write “no solution” in the blank. Show your work. (If needed, use the graph of \( r(w) \) to give estimates for values of \( w \) in the interval \([0, 2]\). Otherwise, give your answer in exact form.)

Solution: \( n(v) = -2(v - 1) + 4. \) Therefore, \( n(r(w)) = -2(r(w) - 1) + 4. \)

\[
\begin{align*}
n(r(w)) &= -2 \\
-2(r(w) - 1) + 4 &= -2 \\
-2r(w) + 6 &= -2 \\
-2r(w) &= -8 \\
r(w) &= 4
\end{align*}
\]

\( w = \frac{2}{3}, 2 \).