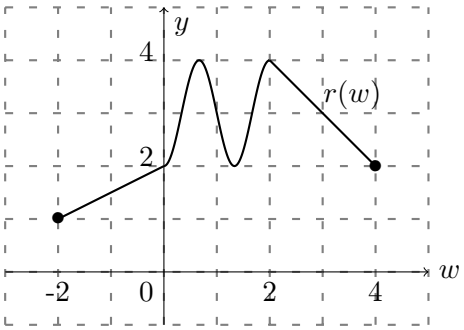
1. [10 points] Given below are three functions. $r(w)$ is given by a graph, $h(t)$ is given by a formula, and $n(v)$ is described verbally.

$n(v)$ 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 $\dfrac{\sqrt{9-4} - \sqrt{6-4}}{9-6} = \dfrac{\sqrt{5} - \sqrt{2}}{3}$.

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, $n(r(w)) = -2(r(w)-1) + 4$.

$$\begin{aligned} n(r(w)) &= -2 \\ -2(r(w)-1) + 4 &= -2 \\ -2r(w) + 6 &= -2 \\ -2r(w) &= -8 \\ r(w) &= 4 \end{aligned}$$

$w =$ 2/3, 2.

