

3.

It so happens that this function can be simplified as:

$$\begin{aligned}w(n) &= \frac{-1+n^3}{-2+n+n^2} \\&= \frac{(n-1)(n^2+n+1)}{(n-1)(n+2)} \\&= \frac{n^2+n+1}{n+2}\end{aligned}$$

To find the vertical asymptote :

$$n+2=0$$

$$n=-2$$

There is a vertical asymptote at $n=-2$

To find the horizontal asymptote :

First we must compare the degrees of the polynomials.

The numerator contains a 3rd degree polynomial while the

denominator contains a 2nd degree polynomial.

Since the polynomial in the numerator is a higher degree than the denominator, there is no horizontal asymptote.

To find the oblique asymptote :

we must divide the numerator by the denominator $\frac{-1+n^3}{-2+n+n^2} = \frac{n^2+n+1}{n+2} = \frac{3}{n+2} + (n-1)$

There is an oblique asymptote at $q=n-1$

