3.

It so happens that this function can be simplified as:

$z(n) = \frac{-8+n^3}{-2-n+n^2}$

$= \frac{(n-2)\left(n^2+2n+4\right)}{(n-2)(n+1)}$

$= \frac{n^2+2n+4}{n+1}$

To find the vertical asymptote :

$n+1=0$

$n=-1$

There is a vertical asymptote at $n=-1$

To find the horizontal asymptote :

First we must compare the degrees of the polynomials.

The numerator contains a 3^{rd} degree polynomial while the denominator contains a 2^{nd} 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 $\frac{-8+n^3}{-2-n+n^2} = \frac{n^2+2n+4}{n+1} = \frac{3}{n+1} + (n+1)$

There is an oblique asymptote at $a=n+1$