

2.

It so happens that this function can be simplified as:

$$\begin{aligned} q(a) &= \frac{-8+a^3}{-6+a+a^2} \\ &= \frac{(a-2)(a^2+2a+4)}{(a-2)(a+3)} \\ &= \frac{a^2+2a+4}{a+3} \end{aligned}$$

To find the vertical asymptote :

$$a+3=0$$

$$a=-3$$

There is a vertical asymptote at $a=-3$

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 :

$$\text{we must divide the numerator by the denominator } \frac{-8+a^3}{-6+a+a^2} = \frac{a^2+2a+4}{a+3} = \frac{7}{a+3} + (a-1)$$

There is an oblique asymptote at $e=a-1$

