

3.

It so happens that this function can be simplified as:

$$\begin{aligned}n(k) &= \frac{-125+k^3}{-15-2k+k^2} \\&= \frac{(k-5)(k^2+5k+25)}{(k-5)(k+3)} \\&= \frac{k^2+5k+25}{k+3}\end{aligned}$$

To find the vertical asymptote :

$$k+3=0$$

$$k=-3$$

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

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 :

we must divide the numerator by the denominator $\frac{-125+k^3}{-15-2k+k^2} = \frac{k^2+5k+25}{k+3} = \frac{19}{k+3} + (k+2)$

There is an oblique asymptote at $e=k+2$

