4.

It so happens that this function can be simplified as:

$$q(k) = \frac{-64+k^3}{-4-3k+k^2}$$

$$= \frac{(k-4)\left(k^2+4k+16\right)}{(k-4)(k+1)}$$

$$= \frac{k^2+4k+16}{k+1}$$

To find the vertical asymptote :

$k+1=0$

$k=-1$

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

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 $\frac{-64+k^3}{-4-3k+k^2} = \frac{k^2+4k+16}{k+1} = \frac{13}{k+1} + (k+3)$

There is an oblique asymptote at $j=k+3$