5.

It so happens that this function can be simplified as:

$$r(t) = \frac{-64+t^3}{-20+t+t^2}$$

$$= \frac{(t-4)\left(t^2+4t+16\right)}{(t-4)(t+5)}$$

$$= \frac{t^2+4t+16}{t+5}$$

To find the vertical asymptote :

$t+5=0$

$t=-5$

There is a vertical asymptote at $t=-5$

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 $\frac{-64+t^3}{-20+t+t^2} = \frac{t^2+4t+16}{t+5} = \frac{21}{t+5} + (t-1)$

There is an oblique asymptote at $z=t-1$