

4.

It so happens that this function can be simplified as:

$$b(s) = \frac{-27+s^3}{-6-s+s^2}$$

$$= \frac{(s-3)(s^2+3s+9)}{(s-3)(s+2)}$$

$$= \frac{s^2+3s+9}{s+2}$$

To find the vertical asymptote :

$$s+2=0$$

$$s=-2$$

There is a vertical asymptote at $s=-2$

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 $\frac{-27+s^3}{-6-s+s^2} = \frac{s^2+3s+9}{s+2} = \frac{7}{s+2} + (s+1)$

There is an oblique asymptote at $k=s+1$

