Answer on Question #56182 - Math – Algebra

19.
Write a function with the following characteristics:
A vertical asymptote at x=3
A horizontal asymptote at y=2
An x-intercept at x=-5
An example y=2x+10/x-3

Solution

Function $y = \frac{16}{x-3} + 2$

has:

A vertical asymptote at x = 3, because denominator is (x-3);

A horizontal asymptote at y = 2, because $lim_{x->\pm\infty} y(x)$=2 ;

An x-intercept at x = -5, because y(-5)=0.

20.
Write a function with the following characteristics:
A vertical asymptote at x=-1
An oblique asymptote at y=x+2

Solution

Function $y = \frac{1}{x-1} + x + 2$

has:

A vertical asymptote at x = 1, because denominator is (x-1);

An oblique asymptote at y = x+2, because

$$k = \lim_{x\to\infty} \frac{y(x)}{x} = \lim_{x\to\infty} \left(\frac{\frac{1}{x-1}+x+2}{x} \right) = 1,$$

$$b = \lim_{x\to\infty} (y - kx) = \lim_{x\to\infty} \left(\frac{1}{x-1} + x + 2 - x \right) =$$

$$= \lim_{x\to\infty} \left(\frac{1}{x-1} + 2 \right) = 2.$$