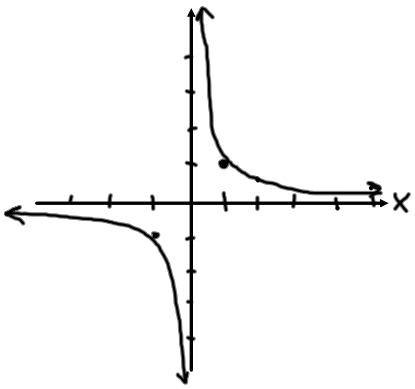
JAN 14/08

RATIONAL FUNCTIONS

$f(x) = \frac{1}{x} \quad x \neq 0$

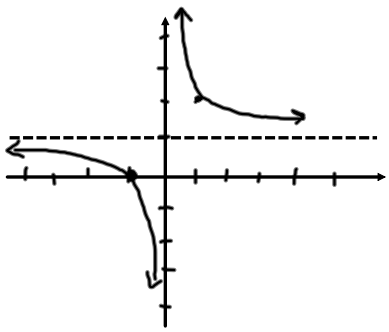


x	y
1000	$\frac{1}{1000}$
100	$\frac{1}{100}$
10	$\frac{1}{10}$
5	$\frac{1}{5}$
2	$\frac{1}{2}$
1	1
$\frac{1}{2}$	2
$\frac{1}{10}$	10

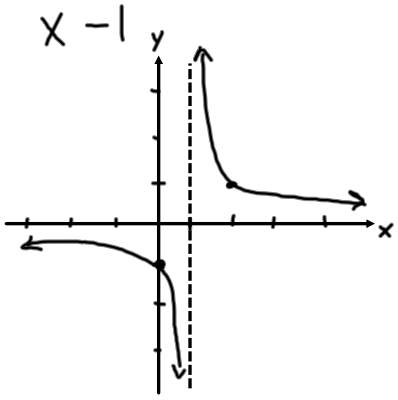
LINE $x=0$ IS A VERTICAL ASYMPTOTE

$y=0$ IS A HORIZONTAL ASYMPTOTE

EG. $y = \frac{1}{x} + 1$



$y = \frac{1}{x-1}$



Jan 14-9:03 AM

LET $f(x) = \frac{p(x)}{q(x)}$

1. THE GRAPH OF f HAS A VERTICAL ASYMPTOTE AT EACH REAL ZERO OF $q(x)$

EG. $f(x) = \frac{1}{(x+2)^2}$ $x=-2$ IS OUR VERTICAL ASYMPTOTE

2. • IF THE DEGREE OF $p(x)$ IS LESS THAN THE DEGREE OF $q(x)$ THEN $y=0$ IS THE ASYMPTOTE

EG. $f(x) = \frac{1}{(x+2)^2}$

ASYMPTOTE $y=0$ — HORIZONTAL

• IF THE DEGREE OF $p(x)$ IS EQUAL TO THE DEGREE OF $q(x)$ THEN THE LINE $y = \frac{a}{b}$ IS A HORIZONTAL ASYMPTOTE WHERE a IS THE LEADING COEFFICIENT OF $p(x)$ AND b IS THE LEADING COEFFICIENT OF $q(x)$

EG. $f(x) = \frac{2x^2}{3x^2+1}$

$y = \frac{2}{3}$ IS A HORIZONTAL ASYMPTOTE

• IF THE DEGREE OF $p(x)$ IS GREATER THAN THE DEGREE OF $q(x)$ THEN THE GRAPH HAS NO HORIZONTAL ASYMPTOTE

EG. $f(x) = \frac{x^3+1}{x^2}$

THERE IS NO HORIZONTAL ASYMPTOTE

Jan 14-9:25 AM