Rational Functions

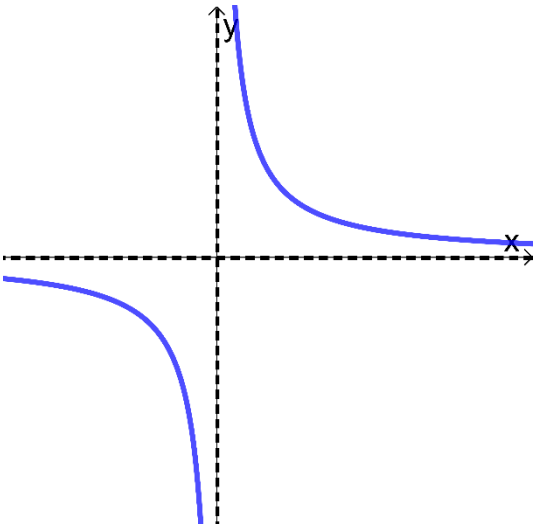
The Reciprocal Function

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

The domain of the function is $x \in \mathbb{R}, x \neq 0$
The range of the function is $f(x) \in \mathbb{R}, f(x) \neq 0$

The graph has

- a vertical asymptote at x = 0
- a horizontal asymptote at y = 0



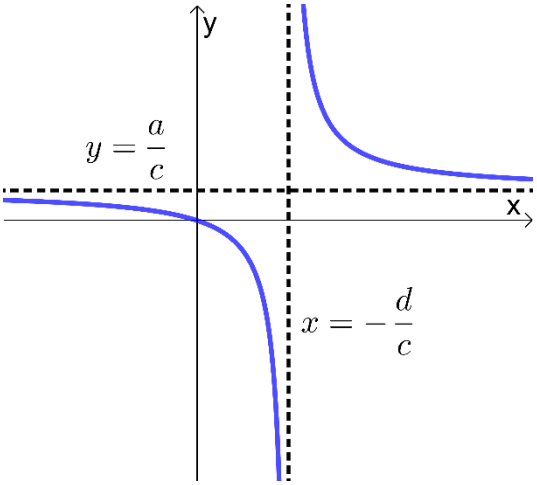
The Rational Function

$f(x) = \frac{ax+b}{cx+d}, x \neq -\frac{d}{c}$

The domain of the function is $x \in \mathbb{R}, x \neq -\frac{d}{c}$
The range of the function is $f(x) \in \mathbb{R}, f(x) \neq \frac{a}{c}$

The graph has

- a vertical asymptote at $x = -\frac{d}{c}$
- a horizontal asymptote at $y = \frac{a}{c}$



Special Function – the hole

If the numerator and denominator have a common linear factor, then the graph of the function is a horizontal line with a hole

e.g. $f(x) = \frac{4(x-3)}{x-3}, x \neq 3$