



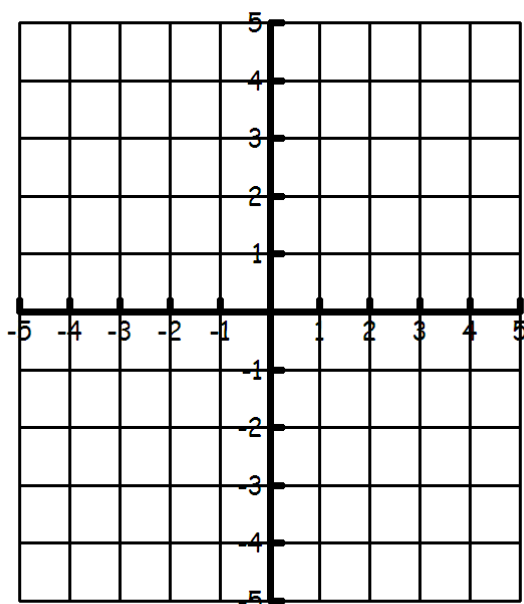
The Graph and Characteristics of $f(x) = \frac{1}{x}$ and Its

Transformations

Investigate and explain characteristics of rational functions including domain, range, zeros, points of discontinuity, intervals of increase and decrease, rates of change, local and absolute extrema, symmetry, asymptotes, and end behavior.

Parent function: $f(x) = \frac{1}{x}$

x	-5	-4	-3	-2	-1	-1/2	-1/3	-1/4	-1/5	0	1/5	1/4	1/3	1/2	1	2	3	4	5
f(x)																			



Domain: _____

Range: _____

x-intercept(s): _____

y-intercept(s): _____

Horizontal Asymptote: _____

Vertical Asymptote: _____

End behavior: _____

Increasing: _____

Decreasing: _____

Transformations

+ : Quadrants I & III

- : Quadrants II & IV

$|a| > 1$: vertical stretch

$0 < |a| < 1$: vertical shrink

+k: up k units

-k: down k units

Horizontal Asymptote: $y = k$

$$f(x) = \frac{\pm a}{(x \pm h)} \pm k$$

+ h: left h units

- h: right h units

Vertical Asymptote: $x = h$

Long Division

Use long division to rewrite $f(x) = \frac{3x+5}{x+2}$ as a transformation of $f(x) = \frac{1}{x}$.

EXAMPLES

Use transformations to describe how the function differs from the parent function. Then state its domain, range, vertical asymptote, and horizontal asymptote.

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

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

3. $f(x) = \frac{3}{x+4}$

4. $f(x) = -\frac{1}{x+7}$

5. $f(x) = \frac{5}{x-6} - 2$

6. $f(x) = \frac{-2x+1}{x+2}$

7. $f(x) = \frac{4x-1}{x+1}$