Rational Functions

Reciprocal Function: $f(x) = \dfrac{1}{x}$

$y = \dfrac{1}{x}$
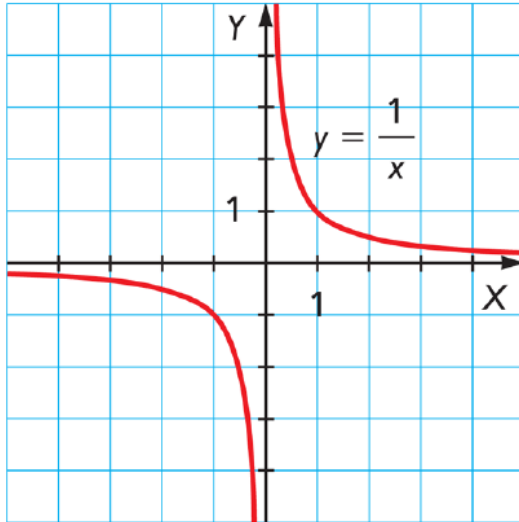
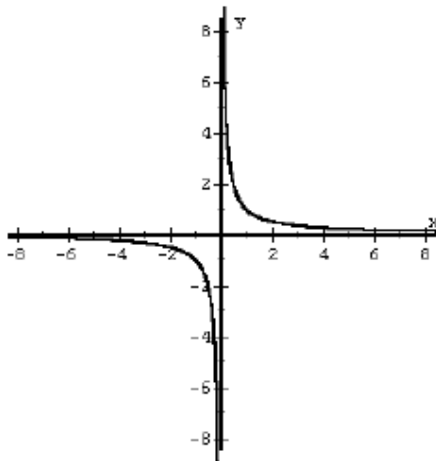**Domain:** All real numbers; $x \neq 0$

Range: All real numbers; $y \neq 0$

X – Intercept: Does not exist

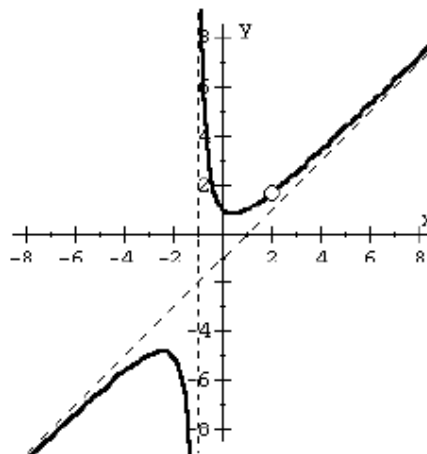**Y – Intercept:** Does not exist

Horizontal asymptote at $y = 0$
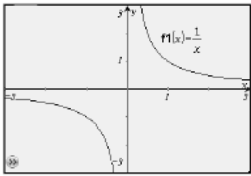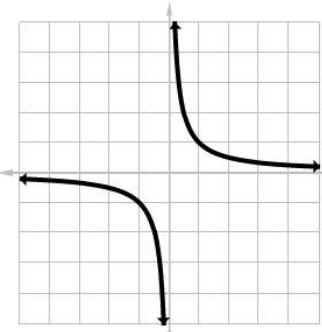
Vertical asymptote at $x = 0$

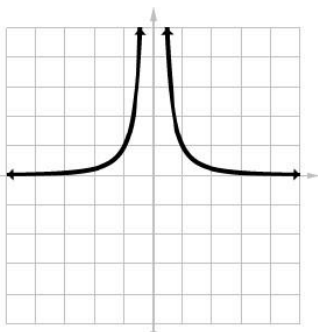$$f(x) = \dfrac{1}{x}$$

Reciprocal

$$f(x) = \dfrac{\left(x^2 + 1\right)(x - 2)}{(x + 1)(x - 2)}$$
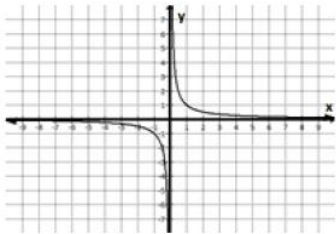
Rational

Rational Functions

Name of Parent Function	Graph of Function	Table of Values		Equation of Parent Function	Special Features or Characteristics
		x	**y**		
		-2	-0.5		• Never intersects the y-axis
Reciprocal Function		-1	-1	$f(x) = \dfrac{1}{x}$	• Domain is all Real Numbers ≠0
		0	undef		• Range is all Real Numbers ≠0
		1	1		
		2	0.5		
		3	0.333		

Parent Function	Graph	Parent Function	Graph
$y = \dfrac{1}{x}$ **Rational,** Odd (Inverse) **Domain:** $(-\infty,0) \cup (0,\infty)$ **Range:** $(-\infty,0) \cup (0,\infty)$ **End Behavior:** $x \rightarrow -\infty, y \rightarrow 0$ $x \rightarrow \infty, y \rightarrow 0$ **Critical points:** $(-1,-1), (1,1)$ **Asymptotes:** $y = 0, x = 0$		$y = \dfrac{1}{x^2}$ **Rational,** Even (Inverse Squared) **Domain:** $(-\infty,0) \cup (0,\infty)$ **Range:** $(0,\infty)$ **End Behavior:** $x \rightarrow -\infty, y \rightarrow 0$ $x \rightarrow \infty, y \rightarrow 0$ **Critical points:** $(-1,1), (1,1)$ **Asymptotes:** $x = 0, y = 0$	

Rational Functions

Parent Function	Graph	Parent Function	Graph
$y = \dfrac{1}{x}$ **Rational (Inverse)**, Odd Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(-\infty, 0) \cup (0, \infty)$ End Behavior: $x \to -\infty,\ y \to 0$ $x \to \infty,\ y \to 0$		$y = \dfrac{1}{x^2}$ **Rational (Inverse Squared)**, Even Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(0, \infty)$ End Behavior: $x \to -\infty,\ y \to 0$ $x \to \infty,\ y \to 0$	