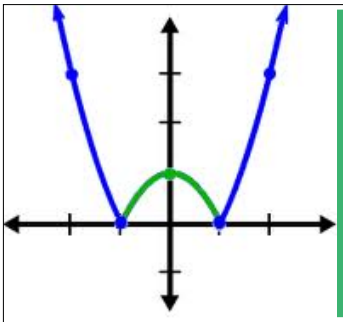
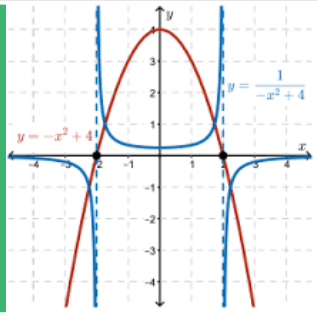


Unit 5: Absolute Values, Reciprocals, Systems, Inequalities

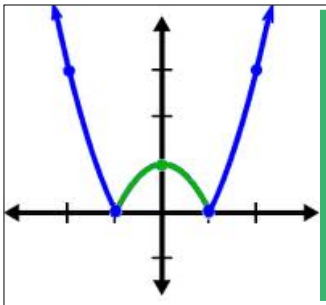


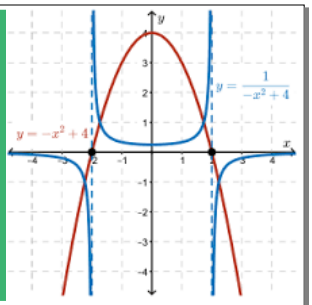
5.3 Reciprocal Functions

The reciprocal of any function, f(x), is $\frac{1}{f(x)}$, where $f(x) \neq 0$.

asymptote - a vertical or horizontal line that a function approaches but never reaches (can't reach this line because then we would divide by zero)

vertical asymptote - for reciprocal functions, these occur at the x-intercepts (you can also think of these as the functions' NPVs)

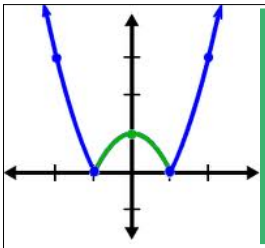


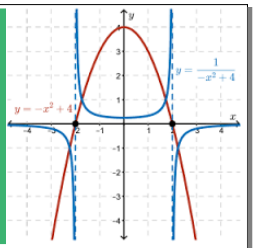


Suggestions for Sketching the Graph of a Reciprocal Function

x-int dotted line

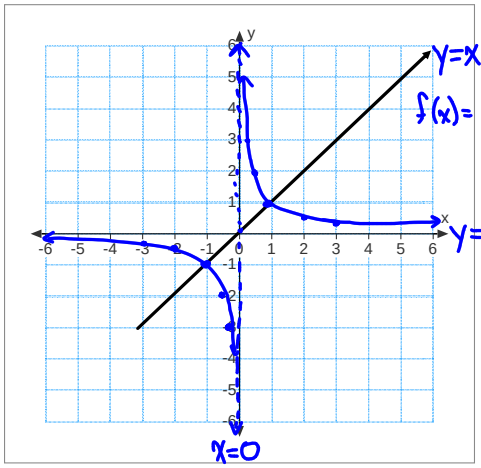
1. Zeros of the original function become vertical asymptotes of the reciprocal function.
2. Mark the **invariant points** where $y = 1$ and $y = -1$. $\frac{1}{y}$
3. The y-intercept of the reciprocal graph is the reciprocal of the y-intercept on the original graph.
4. Points where $y = 2$ on the original graph become points where $y = \frac{1}{2}$ on the reciprocal graph, etc.
5. Complete the reciprocal graph based on the information above.





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

State domain, range, equation of asymptotes, and invariant points.

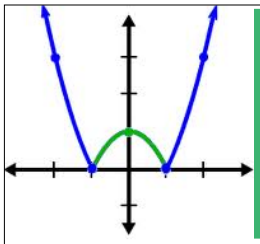


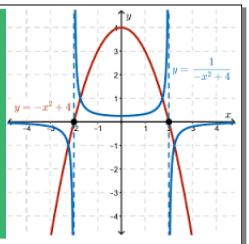
Domain: $\{x \neq 0, x \in \mathbb{R}\}$

Range: $\{y \neq 0, y \in \mathbb{R}\}$

Asymptotes: $x = 0$
$y = 0$

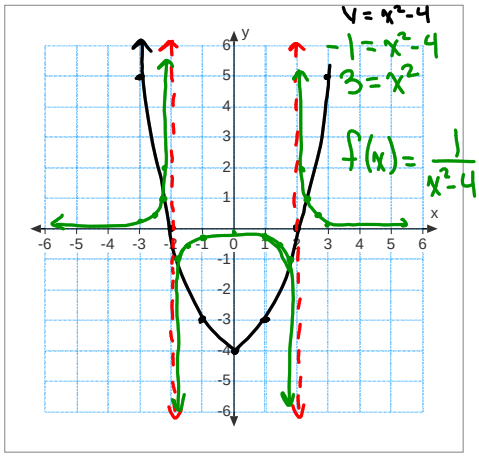
Invariant Points:
$(1, 1)$
$(-1, -1)$





Ex.) Sketch $f(x) = \frac{1}{x^2 - 4}$

State domain, range, equation of asymptotes, and invariant points.

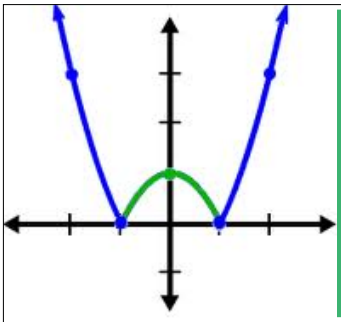


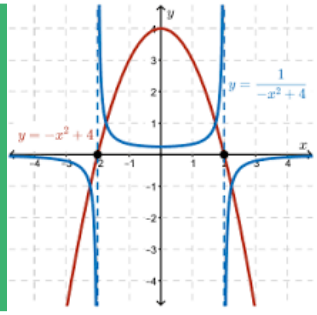
Domain: $\{x \neq \pm 2, x \in \mathbb{R}\}$

Range: $\{y \neq 0, y \in \mathbb{R}\}$

Asymptotes: $y = 0$
$x = -2$
$x = 2$

Invariant Points:
$(2.2, 1)$ $(-2.2, 1)$
$(-1.7, -1)$ $(1.7, -1)$





Pg. 403 #1-3,5-7,9.