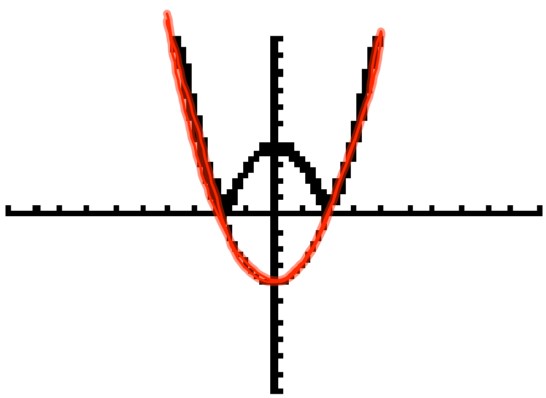
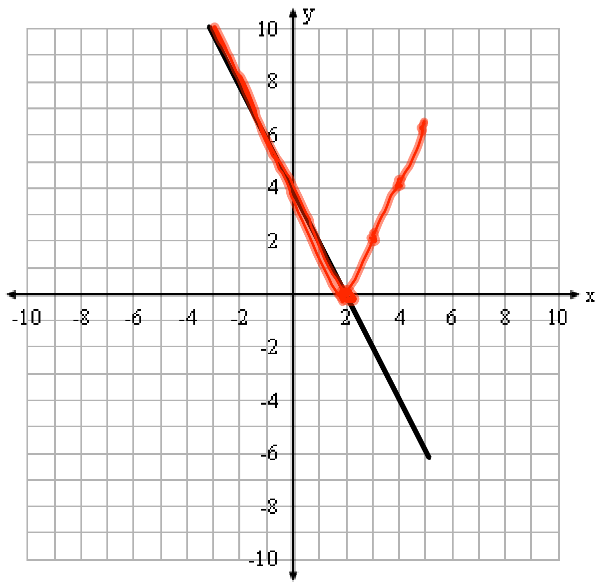
## 1.6 Graphing Reciprocal and Absolute Value Functions

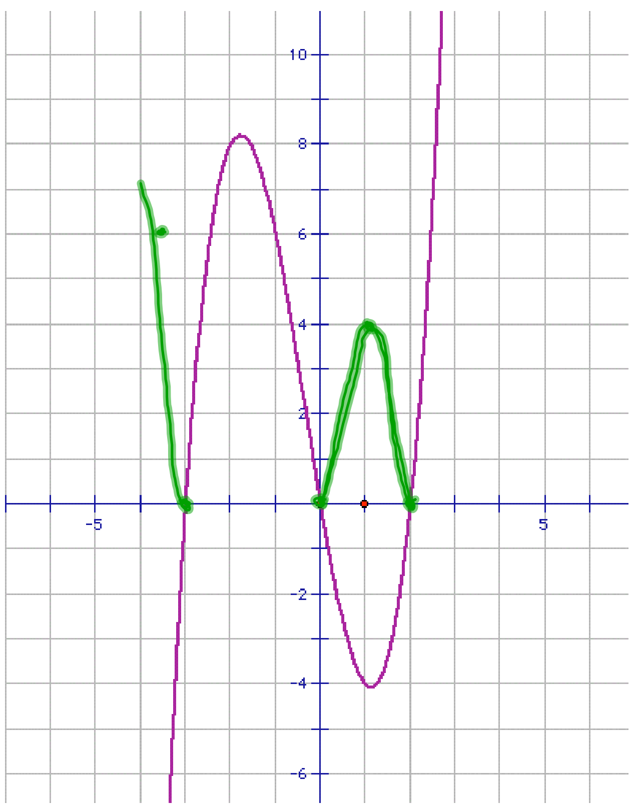
Graph $y = x^2 - 4$ and $y = |x^2 - 4|$ on the same axis



You should notice the following:
When you graph absolute value functions the following are true:
a) For $y = f(x)$ if $f(x) > 0$ the graph remains the same.
b) For $y = f(x)$ if $f(x) < 0$ the graph is reflected in the $x$ – axis.

Sketch the absolute value of each of the following graphs



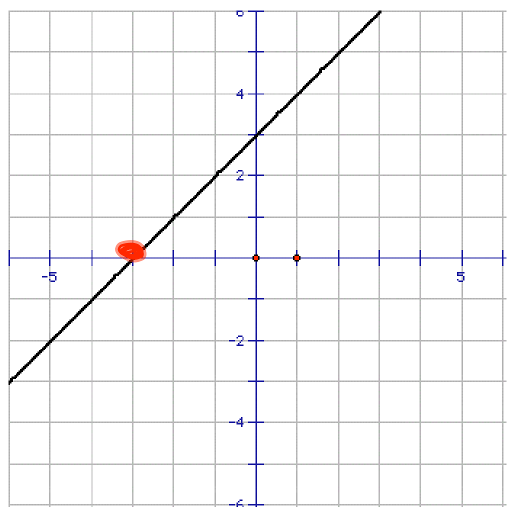



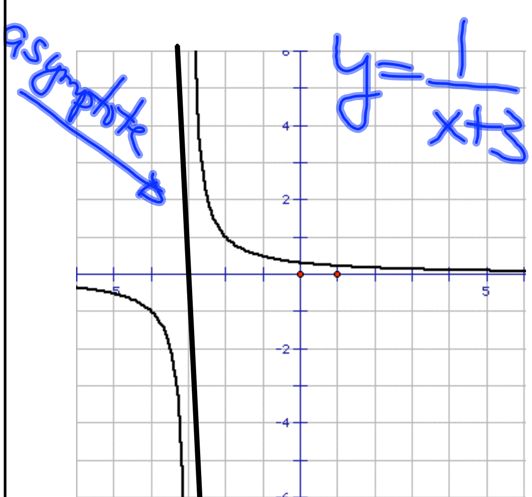
## Reciprocal Transformations

The reciprocal of f(x) is $\dfrac{1}{f(x)}$

Consider the function f(x) = x + 3 its reciprocal is $\dfrac{1}{x+3}$

f(x) = x + 3






| x | y = f(x) | $y = \frac{1}{f(x)}$ |
|---|---|---|
| -6 | -3 | -1/3 |
| -5 | -2 | -1/2 |
| -4 | -1 | -1 |
| -3 | 0 | Undefined |
| -2 | 1 | 1 |
| -1 | 2 | 1/2 |
| 0 | 3 | 1/3 |
| 1 | 4 | 1/4 |
| 2 | 5 | 1/5 |
| 3 | 6 | 1/6 |

original y-coordinate you take their reciprocal to determine y-coordinate of your new fn

How is the graph of the reciprocal function created from y = f(x)?

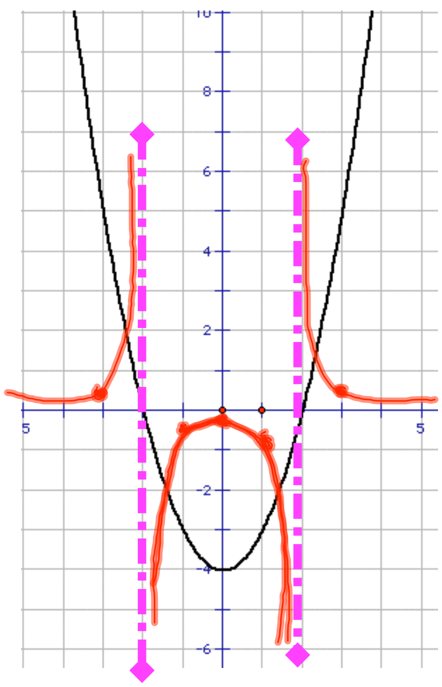
The y-intercept of f(x) is 3. The y-intercept of 1/f(x) is $\frac{1}{3}$.

The x-intercept of f(x) is -3. The equation of the vertical asymptote of 1/f(x) is x=-3.

Using the table of values, the invariant points are : (-4, -1) (-2, 1)

**Sketching graphs of y = 1/f(x)**

1. Create a table of values for the original function
2. Create a table of values for 1/f(x) using the following rule. The point (x, y) in f(x) becomes (x, 1/y) in 1/f(x)
3. Sketch the graph of y = 1/f(x)




Using the graph of y = f(x) complete the table of values and then sketch the graph of the 1/f(x)

| x | y = f(x) | y = 1/f(x) |
|---|---|---|
| -4 | — | — |
| -3 | 5 | 1/5 |
| -2 | 0 | undefined |
| -1 | -3 | -1/3 |
| 0 | -4 | -1/4 |
| 1 | -3 | -1/3 |
| 2 | 0 | undefined |
| 3 | 5 | 1/5 |
| 4 | — | — |

Pg. 57
1-3, 6, 10