# 1 Transforming Functions

1.1 Concepts

1. Vertical stretching and shifting is what is done to $f(x)$. Multiplying by a constant greater than 1 stretches the graph and adding a positive number shifts the graph up. Horizontal stretching and shifting is what is done to the x inside $f(x)$. Multiplying by a constant greater than 1 compresses the graph and adding a positive number shifts the graph to the left. We treat the order of shifting and stretching opposite from the vertical case.
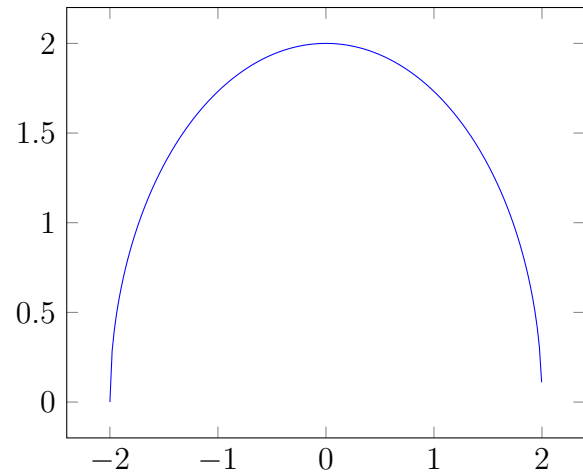
1.2 Example
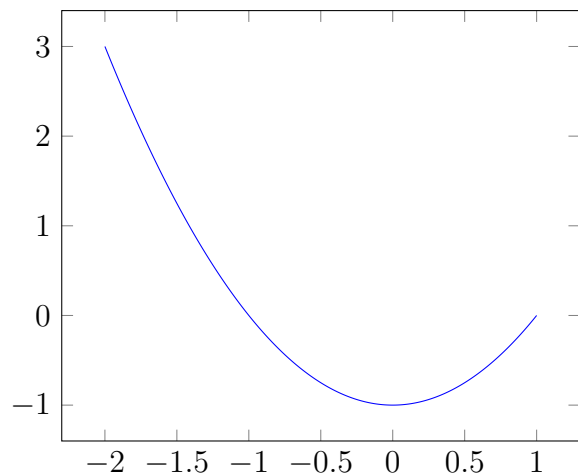
2. Let $f(x)$ be the function shown in the graph
Draw and find the domain and range of $-f(-x-3)$.

1.3 Problems

3. Using the same function from before, draw and find the domain and range of $2f(2x - 6) + 1$.

4. Using the same function from before, draw and find the domain and range of $-f(-x/2) + 3$.

5. Let $g(x)$ be the function shown in the graph
   Draw and find the domain and range of $g(-x+3)/2 - 1$.

6. Using the same function from before, draw and find the domain and range of $-g(1 - x/2) + 1$.

7. Write the function that is $\sqrt{x}$ shifted to the left by 3 then horizontally stretched by 5. Then compressed vertically by a factor of 4 and shifted down by 1.

8. Write the function that is $1/x$ shifted to the right by 2 then horizontally compressed by 3 and reflected. Then stretched vertically by a factor of 2 and shifted down by 4.