

# Chapter 1

## Functions and Graphs

### Review Exercise Solution

#### Review Exercise 1.314

##### Instruction

State the domain and range of the function  $h(x) = \frac{1}{x+4}$ .

##### Solution

We can start by sketching a graph of the function  $h(x)$  to improve our understanding of its characteristics.

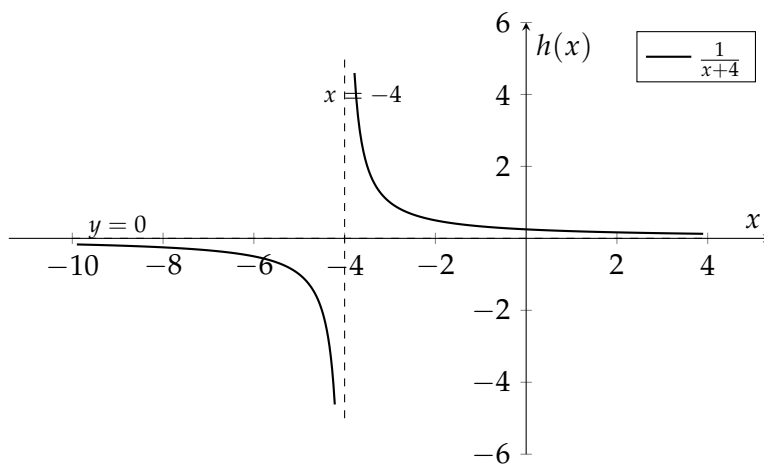


Figure 1.1: Graph of  $\frac{1}{x+4}$ . The function has a vertical asymptote at  $x = -4$  and a horizontal asymptote at  $y = 0$ .

To find the domain of  $h$  we note that  $\frac{1}{x+4}$  is defined when the denominator is nonzero, the domain is  $\{x \mid x \neq -4\}$ .

To find the range of  $h$ , we need to find the values of  $y$  such that there exists a real number  $x$  in the domain with the property that

$$\frac{1}{x+4} = y.$$

Solving this equation for  $x$ , we find that

$$x = \frac{1}{y} - 4.$$

Therefore, as long as  $y \neq 0$ , there exists a real number  $x$  in the domain such that  $h(x) = y$ . Thus the range is  $\{y \mid y \neq 0\}$

**Answer**

Domain:  $\{x \mid x \neq -4\}$ , range:  $\{y \mid y \neq 0\}$ .