Section 1.4 WHY CAN’T WE DIVIDE BY 0?

There are two cases to consider. The first is expressions like $\frac{18}{0}$, and the second is $\frac{0}{0}$.

First, remember that division is defined in terms of multiplication. For example,

$$\frac{18}{6} = 3 \text{ since } 3 \cdot 6 = 18.$$  

• **CASE 1.** Suppose we try to compute $\frac{18}{0}$. Why is this impossible?

**Note:** The same kind of argument shows that it’s impossible to compute $\frac{n}{0}$, where $n \neq 0$.

• **CASE 2.** Now suppose we try to compute $\frac{0}{0}$. This is more subtle. At first, it looks like we can compute this. For example, we might say

$$\frac{0}{0} = 1, \text{ since } 1 \cdot 0 = 0.$$  

But there is a problem with this argument. Can you think of what it is?

• **FINAL NOTE:** It’s OK to have zero in the numerator, as long as it is not in the denominator. For example, suppose we want to compute $\frac{0}{5}$. What is it equal to? Why?