7.4: The Alternative Hypothesis

If the null hypothesis is rejected, then we will need some other explanation, which we call the alternative hypothesis, H_A or H_1. The alternative hypothesis is simply the reverse of the null hypothesis, and there are three options, depending on where we expect the difference to lie. Thus, our alternative hypothesis is the mathematical way of stating our research question. If we expect our obtained sample mean to be above or below the null hypothesis value, which we call a directional hypothesis, then our alternative hypothesis takes the form:

$$\mathrm{H_A} : \mu > 7.47 \quad \text{or} \quad \mathrm{H_A} : \mu < 7.47$$

based on the research question itself. We should only use a directional hypothesis if we have good reason, based on prior observations or research, to suspect a particular direction. When we do not know the direction, such as when we are entering a new area of research, we use a non-directional alternative:

$$\mathrm{H_A} : \mu \neq 7.47$$

We will set different criteria for rejecting the null hypothesis based on the directionality (greater than, less than, or not equal to) of the alternative. To understand why, we need to see where our criteria come from and how they relate to z-scores and distributions.