

Practicum 3: Statistical Inference I
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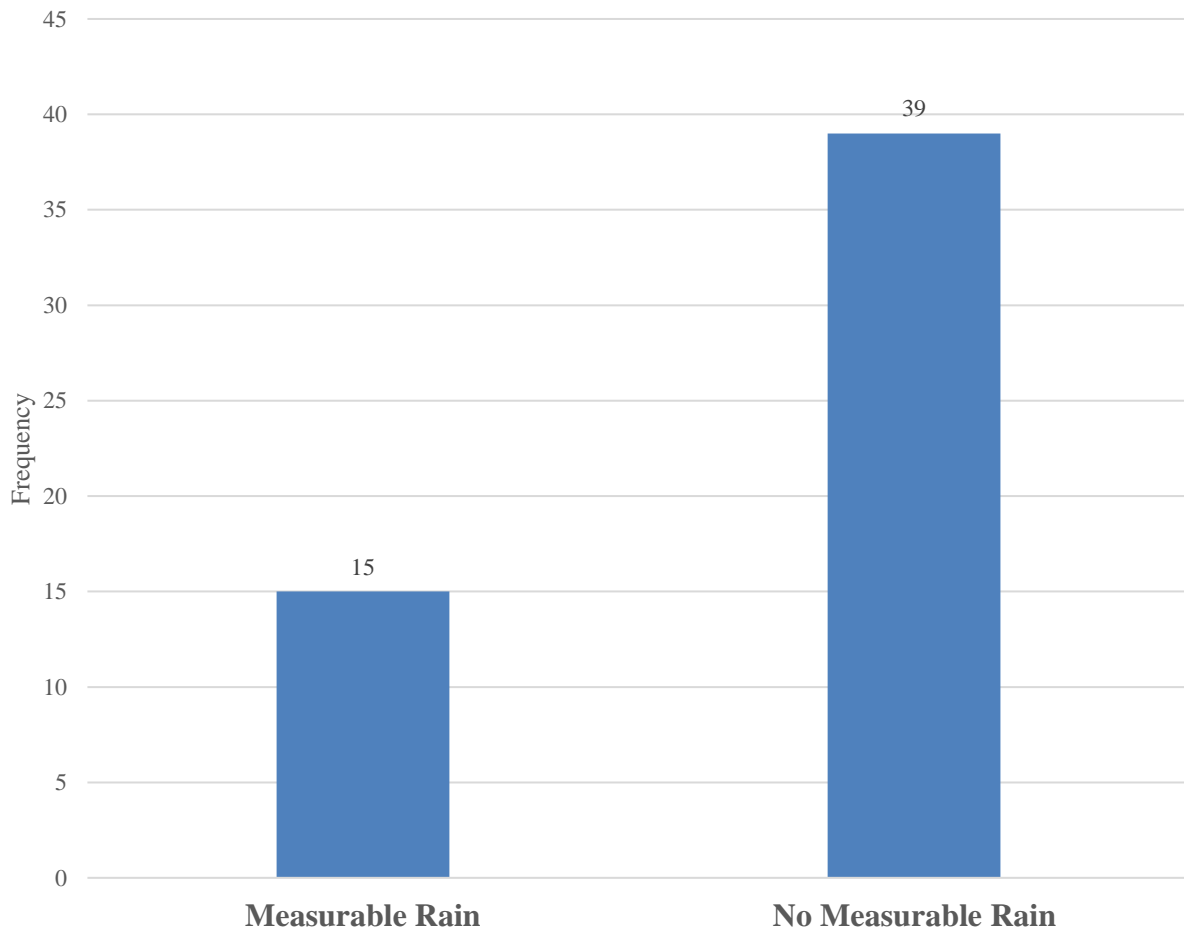
Research Question 1: Probability of Rain

In this first problem, we are to estimate the probability of rain on July 4. It does not make sense to include dates too far from July 4 to estimate this. As such, I will only use data that is within two weeks of July 4, that is, from June 21 to July 17, inclusive.

Because we are asked to estimate a single proportion, and not compare two or more of them, I will use the one-sample proportions procedure

In that subset of $n = 54$ days, it rained a total of $x = 15$ days. Calculating the confidence interval for the population proportion (Section 8.4), we get a point estimate of 0.28, with a 95% confidence interval of 0.158 to 0.397. Thus, we are 95% confident that the probability of it raining on July 4 is between 16 and 40%.

The following graphic shows the distribution of rain days in this subset of the data.



Research Question 2: High Temperature

In this part, we are to estimate the high temperature for July 4. Again, I will restrict my data to the two weeks on either side of July 4 (from June 21 to July 17, inclusive). Since we are estimating a population mean, but we do not know the population standard deviation, I will use a t-procedure to obtain the point estimate and a 95% confidence interval. Since we are looking at estimating a single mean and not comparing two means, I will use a one-sample t-procedure.

Using the methods in Section 8.2, I need to calculate the sample mean, the sample standard deviation, and the sample size. Using Excel, these values are 92.28, 5.62, and 54, respectively. With these numbers, the 95% confidence interval is from 90.74 to 93.81. Thus, we are 95% confident that the high temperature on July 4 will be between 90.74 and 93.81°F, with a point estimate of 92.28°F.

The histogram below shows the distribution of daily high temperatures in the subset. Note that it is skewed left. However, since the sample size is large enough, this skew should not concern us.

