STAT 145 – Mini Project 2

A Statistical Analysis of the Age of Pennies

Timothy Jimothy

I decided to test the average age of pennies. I will conduct a test of significance at the 10% significance level ($\alpha = .10$) to determine if on average, pennies are younger than 20 years old. Since it is currently 2016, the Hypotheses will look like this

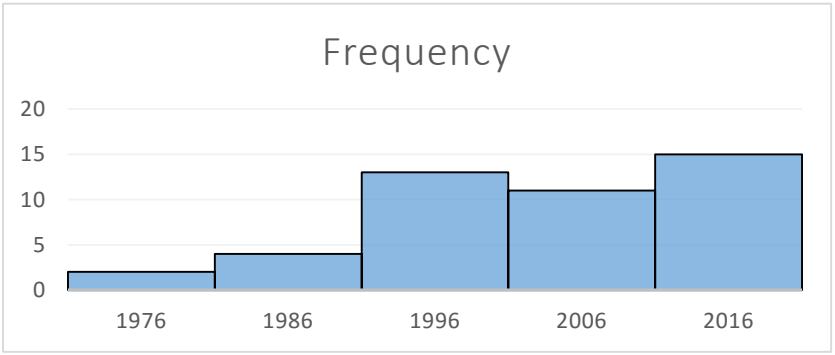
$$H_o: \mu = 1996$$

$$H_a: \mu > 1996$$

I randomly selected 12 pennies from my piggy bank. Since I shook the piggy bank before choosing the pennies, and the coins come from all over the place I think it is safe to say that the selection is unbiased. Below is a Stemplot of the pennies I chose. I chose to split the stems.

197	7 9
198	
198	
199	0 0 4
199	8
200	1 1
200	5
201	4 4 4

Unfortunately, the data doesn't look very normal at all. It is not symmetric, and it has some possible outliers (1977 and 1979). Since my sample size is only 12, the t-procedures will not give reliable results. So I collected more pennies, until I had a sample of size 45.



Even though the data is skewed left, the sample size is large enough (45) so that the t-procedures will produce reliable results.

Since my data set is pretty big, I used Microsoft Excel to calculate mean and standard deviation.

$$\bar{X} = 1999.2$$

$$s = 13.2$$

The average I calculated does seem to fit my claim, since it is greater than 1996. But now I need to find out if the difference is significant. I can calculate the 1-sample t-procedure test statistic.

$$t = \frac{\bar{X} - \mu_o}{s/\sqrt{n}} = \frac{1999.2 - 1996}{13.2/\sqrt{45}} = 1.63$$

The degrees of freedom for this test is n – 1 = 45 – 1 = 44. But since 44 isn't on the table, I will use 40 degrees of freedom to be safe. I find that 1.63 falls in between 1.303 and 1.684 on the table. Since this was a One-Sided Test, I now know the range for my P-value.

$$.05 < \text{P-value} < .10$$

Since I chose $\alpha = .10$, I see that P-value < α. Therefore I can reject the null hypothesis and conclude that the average year on a penny is greater than 1996. In other words, I can claim, on average, pennies are in fact younger than 20 years old. Although it is important to note that this is true for a 10% significance level, but It wouldn't have been true had I chosen $\alpha = .05$.