EXAMPLES OF HYPOTHESIS TEST ABOUT THE POPULATION MEAN

1. In the text and in class, we played with a scenario involving the average diameter of large pizzas from Dominos in Australia. A competitor of Dominos is Eagle Boys. The diameters of a sample of 15 Eagle Boys large pizzas are below. Use the data to determine if there is statistically significant evidence that on average, Eagle Boys large pizzas exceeds 28.5 cm. Use $\alpha = 0.05$.

28.19	28.48	28.54	28.61	28.63	28.68	28.68	28.94
29.09	29.38	29.38	29.38	29.53	29.78	30.02	

First, enter the numbers in a Stat list on your TI to get the mean and standard deviation.

n = 15 $\quad \bar{x} = 29.0207$ $\quad$ s = 0.5345

F. (i) Population: All Eagle Boys large pizzas in Australia

(ii) Sample: 15 Eagle Boys large pizzas in Australia

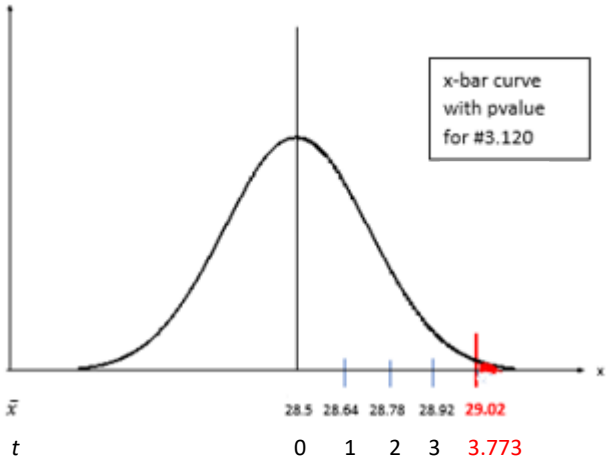
(iii) Parameter: True mean diameter of Eagle Boys large pizzas in Australia

(iv) Hypotheses: H_o: $\mu = 28.5$

H_a: $\mu > 28.5$

R. Conditions: Since n = 15 which is less than 30, and we are not told that the diameters of these pizzas have a normal distribution, the conditions are NOT met. Proceed anyway.

E. $t = \frac{29.0207 - 28.5}{\frac{0.5345}{\sqrt{15}}}$ = 3.77299 (round to 3.773) $\quad$ df = 14



p-value = $P(\bar{x} > 29.02) = P(t > 3.7654) = 0.00103$ $\quad$ Since 0.001 < 0.01, reject H_o.

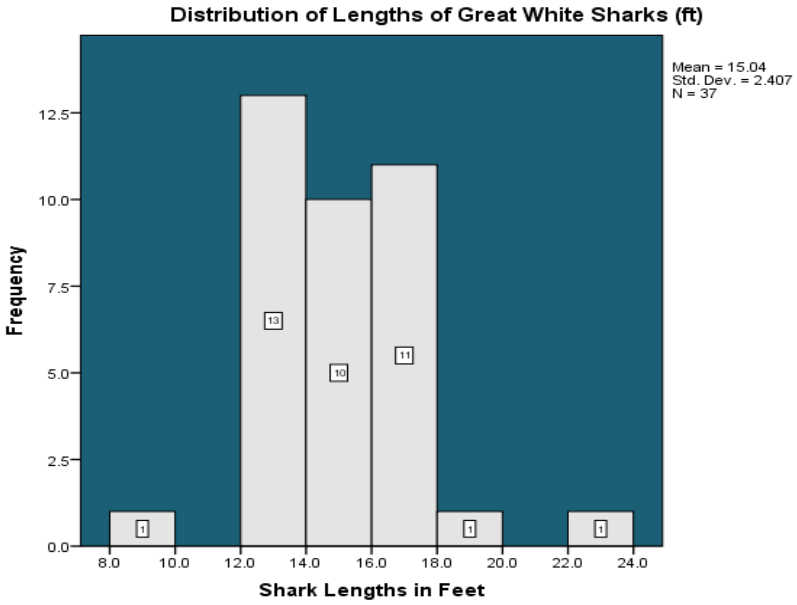
D. There is sufficient evidence to indicate that the true mean diameter of Eagle Boys large pizzas in Australia is greater than 28.5 cm.

P-value interpretation: If the null hypothesis is true, that is, if the true mean diameter of all Eagle Boys large pizzas in Australia really is 28.5 cm, then the probability of getting a sample mean of 29.0207 cm from 15 of this type of pizza, or anything more extreme, is only 0.103%.

2. Exercise #5.37 about the length of great white sharks intrigued me, so I looked up information about great white sharks on Wikipedia, which reported that the average length of both genders is 13.95' (https://en.wikipedia.org/wiki/Great_white_shark).

   A sample of 37 great whites had a mean length of 15.04 feet with a standard deviation of 2.407'. (The data is not the same as #5.37.) Is there sufficient evidence to indicate that the true mean length of great white sharks differs from the Wikipedia article's claim of 13.95'? Test at a 0.02 level of significance. Show all FRED steps.

   When you are finished with the hypothesis test, interpret the p-value in the context of the problem.



3. The following data is how much students at GVSU spent on textbooks last semester:

165 240 250 280 295 320 325 340 370 380 404 450

Is there sufficient evidence to indicate that GVSU students spend less than the national average of $354.75 per semester on textbooks? If necessary, use a 0.03 level of significance.