STAT 145 Week 9 Homework

Homework Problems (due as one file to the drop box by Friday 7/17 at 11:59 PM)

Chapter 9 Homework

#65,

#79 (show the complete testing process as taught in notes)

#85 (show the complete testing process as taught in notes---data is found in Week 9 data file)

65.

Previously, an organization reported that teenagers spent 4.5 hours per week, on average, on the phone. The organization thinks that, currently, the mean is higher. Fifteen randomly chosen teenagers were asked how many hours per week they spend on the phone. The sample mean was 4.75 hours with a sample standard deviation of 2.0. Conduct a hypothesis test. The null and alternative hypotheses are:

a. H_o: $\bar{x}$ = 4.5, H_a : $\bar{x}$ > 4.5
b. H_o: $\mu \geq 4.5$, H_a: $\mu < 4.5$
c. H_o: $\mu = 4.75$, H_a: $\mu > 4.75$
d. H_o: $\mu = 4.5$, H_a: $\mu > 4.5$

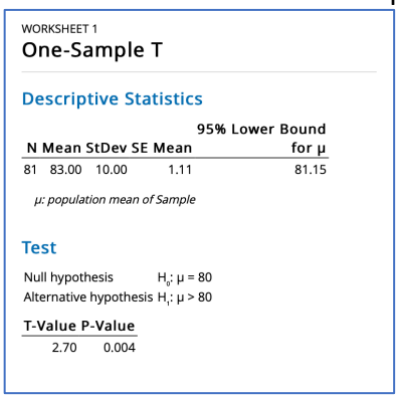
79.

In 1955, *Life Magazine* reported that the 25 year-old mother of three worked, on average, an 80 hour week. Recently, many groups have been studying whether or not the women's movement has, in fact, resulted in an increase in the average work week for women (combining employment and at-home work). Suppose a study was done to determine if the mean work week has increased. 81 women were surveyed with the following results. The sample mean was 83; the sample standard deviation was ten. Does it appear that the mean work week has increased for women at the 5% level?

Population
Variable is number of hours of work per week; it is numerical
μ = the true mean number of hours women work per week
Goal: test to see if the μ is greater than 80 hours per week.
Method
Ho: μ = 80
Ha: μ > 80
Alpha = 0.05

T-curve with df

Sample
We can assume a normal sampling distribution since the n > 30.



WORKSHEET 1
One-Sample T

Descriptive Statistics

N	Mean	StDev	SE Mean	95% Lower Bound for μ
81	83.00	10.00	1.11	81.15

μ: population mean of Sample

Test

Null hypothesis H_0: μ = 80
Alternative hypothesis H_1: μ > 80

T-Value	P-Value
2.70	0.004

Results
T = 2.70 df = 80
The sample mean is 2.70 standard errors **above** the hypothesized mean of 80 hours per week. Assuming the true mean is 80 hours per week, there is a **0.004** probability of getting a sample mean at least as extreme as the one I got from sampling.
Conclusion
Is the P-value ≤ alpha? Yes, we CAN reject the null.
At the 5% level of significance, the sample data DOES provide sufficient evidence to say that the true mean number of hours worked per week by women is greater than 80 hours per week.

Everyday conclusion: it appears that there is a statistical increase in the number of hours worked per week by women!

85.

The mean work week for engineers in a start-up company is believed to be about 60 hours. A newly hired engineer hopes that it's shorter. She asks ten engineering friends in start-ups for the lengths of their mean work weeks. Based on the results that follow, should she count on the mean work week to be shorter than 60 hours?

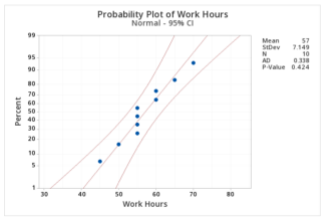
Population
Variable is number of hours of work per week for Engineers; it is numerical
μ = the true mean number of hours Engineers work per week
Goal: test to see if the μ is less than 60 hours per week.
Method
Ho: μ = 60
Ha: μ < 60
Alpha = 0.05
T-curve with df

Sample

Since the P-value of the NPP is > 0.05, we can assume a normal model.

WORK HOURS (#85)

Probability Plot of Work Hours



WORK HOURS (#85)

One-Sample T: Work Hours

Descriptive Statistics

N	Mean	StDev	SE Mean	95% Upper Bound for μ
10	57.00	7.15	2.26	61.14

μ: population mean of Work Hours

Test

Null hypothesis H_0: μ = 60

Alternative hypothesis H_1: μ < 60

T-Value	P-Value
-1.33	0.109

Results

T = -1.33 df = 9

The sample mean is 1.33 standard errors **below** the hypothesized mean of 60 hours per week. Assuming the true mean is 60 hours per week, there is a **0.109** probability of getting a sample mean at least as extreme as the one I got from sampling.

Conclusion

Is the P-value ≤ alpha? NO, we CANNOT reject the null.

At the 5% level of significance, the sample data DOES NOT provide sufficient evidence to say that the true mean number of hours worked per week by Engineers is less than 60 hours per week.

Everyday conclusion: No, the work week is not statistically shorter than 60 hours/week.