

STAT 110: Homework 8 Solutions (20 pts)

Fall 2017

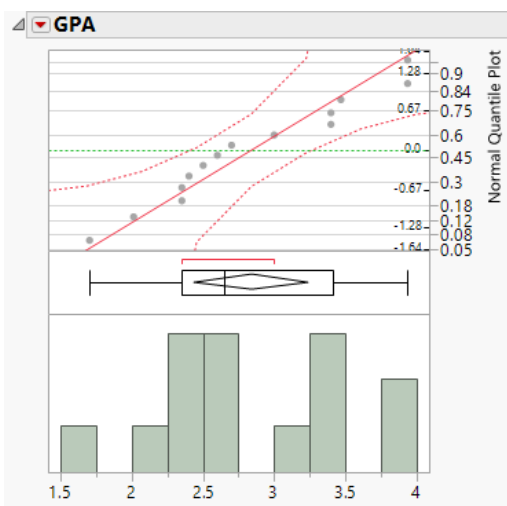
Note: You must attach a copy of the JMP output for both problems to obtain full credit.

1. Several STAT 110 students were randomly selected and surveyed. The data from this survey study can be found in the file **Student Survey Data.JMP**. In this problem, you will examine the GPAs of students that skip at least one class per week. To do this in JMP, you can select **Analyze > Distribution** and put *Skip Class* in the **By** box and *GPA* in the **Y, Columns** box. Then, look at the output for the “Yes” group.

a. Complete the table below using the results from JMP. (1 pt)

Skip Classes?	GPA	
	Mean	Standard Deviation
Yes	2.84	0.6975

b. In parts c - e, you will conduct a t-test to determine if the mean GPA of students who skip at least one class per week is below a B average (3.0). Is the t-test an appropriate analysis for these data? Hint: Check the normality assumption behind the t-test for a single mean. (1 pt)



The sample size (n=14) does not meet the recommended guideline for the t-test to be valid. However, based on the normal quantile plot, it is reasonable to assume that the original population is normally distributed, which indicates that the t-test is valid.

c. Set up the null and alternative hypotheses to investigate the research question: Is the mean GPA of students who skip at least one class per week below a B average (3.0)? (1 pt)

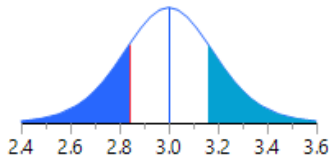
Let μ = the true mean GPA of students who skip class at least once a week

$H_0: \mu = 3.0$

$H_a: \mu < 3.0$

- d. Find the appropriate p-value for investigating the research question. (2 pts)

Test Mean	
Hypothesized Value	3
Actual Estimate	2.84
DF	13
Std Dev	0.69751
t Test	
Test Statistic	-0.8583
Prob > t	0.4063
Prob > t	0.7969
Prob < t	0.2031



p-value: 0.2031

- e. Write a conclusion to address the research question in the context of the problem. (2 pts)

There is not enough evidence to conclude that the mean GPA of WSU students who skip at least one class per week below a B average (3.0).

- f. Use JMP to find the 95% confidence interval for the mean GPA of students who skip at least one class per week. (1 pt)

Summary Statistics	
Mean	2.84
Std Dev	0.6975121
Std Err Mean	0.1864179
Upper 95% Mean	3.2427315
Lower 95% Mean	2.4372685
N	14

Lower endpoint: 2.44

Upper endpoint: 3.24

- g. Interpret the confidence interval from part f in the context of the problem. (2 pts)

We are 95% certain the true mean GPA of WSU students who skip class at least once a week is somewhere between 2.44 and 3.24.

- h. Does this interval agree with your conclusion given in part e? Explain your reasoning. (1 pt)

Yes. Since the 95% confidence interval includes 3.0, it is plausible that the true mean GPA of WSU students who skip class at least once a week could be 3.0 (or even as high as 3.24). This agrees with the result of the hypothesis test – there is not enough evidence the mean GPA is less than 3.0.

2. It is generally recommended that individuals exercise at least 3 times per week. Using the STAT 110 student survey data once again, you will investigate whether the data provides evidence that WSU students work out more than 3 times per week, on average.

a. Use JMP to find both the mean and the standard deviation of *Exercise Per Week*. Enter these values in the following table. (1 pt)

Variable	Mean	Standard Deviation
<i>Number of Times Exercised Per Week</i>	3.89	1.9965

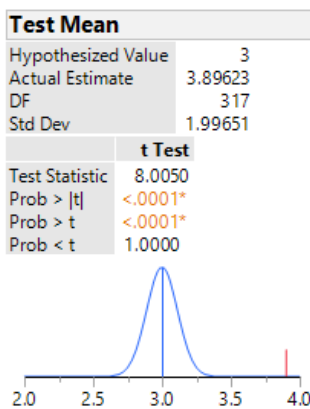
b. Set up the null and alternative hypotheses to investigate this research question. (1 pt)

Let μ = the true mean number of times exercised per week

$H_0: \mu = 3$

$H_a: \mu > 3$

c. Find the appropriate p-value for investigating this research question. (2 pts)



p-value: < 0.0001

d. Write a conclusion in the context of the problem. (2 pts)

There is evidence that WSU students work out more than 3 times per week, on average.

- e. Use JMP to find the 95% confidence interval for the mean number of times a WSU student exercises per week. (1 pt)

Summary Statistics	
Mean	3.8962264
Std Dev	1.9965076
Std Err Mean	0.1119586
Upper 95% Mean	4.1165022
Lower 95% Mean	3.6759506
N	318

Lower endpoint: 3.68

Upper endpoint: 4.12

- f. Interpret the confidence interval from part e in the context of the problem. (2 pts)

We are 95% sure the that WSU students, on average, exercise anywhere from 3.68 to 4.12 times per week.