Unit 9 Review

Significance Tests

**9.1 Learning Target** • **Significance Tests with Proportions**

z =

1. According to an article in *Educational* Journal, 87% of high school students graduate. In a random sample of 250 high school students, it was discovered that 225 of them graduated. Is this significant evidence to prove that more than 87% of high school students graduate? (SHOW ALL STEPS)
2. If the problem above was changed to, “*Is this significant evidence to prove that high school students that graduate is NOT 87%*”

Show how this would change:

* 1. The curve (shading)
  2. The p-value
  3. The conclusion

1. The U.S. Coast Guard claims that 40% of small boats are in violation with one or more safety regulations. In a sample of 300 small boats in the Cape Cod area 115 were found to be in violation. Is this significant evidence to prove that less than 40% of small boats are in violation? (SHOW ALL STEPS)
2. If the problem above was changed to, “*Is this significant evidence to prove that small boats in violation of safety regulations is NOT 40%”*

Show how this would change:

* 1. The curve (shading)
  2. The p-value
  3. The conclusion

**9.2 Learning Target** • **Significance Tests with Means**

z =

1. Chelsea wants to rent a one-bedroom apartment for the upcoming fall semester. The college claims the monthly rent is $800 with a standard deviation is $80. She collects data on the monthly rent of 40 different apartments and finds the average to be $775. Is this significant evidence to prove that the cost of an apartment is less than $775 at the 0.04 significance level? (SHOW ALL STEPS)
2. If the problem above was changed to, “*Is this significant evidence to prove that the cost of an apartment is NOT $750”*

Show how this would change:

* 1. The curve (shading)
  2. The p-value
  3. The conclusion

Consider the following scenario to answer questions 7-10: A mean lead level of 15 parts per billion (ppb) is considered safe, while anything above 15 ppb is considered dangerous. An environmentalist believes the Flint water is unsafe, so he takes a random sample of 200 households. He finds the average lead level of the sample is 18.6 ppb.

1. Use the information above to perform a significance test to determine if the average level of lead in Flint’s water is above the safe level. (SHOW ALL STEPS)
   1. **Learning Target** • **Errors with Significance Tests**
2. What if the decision to reject H0 was not correct…?
   1. What type of error is this?
   2. What would be a consequence of this error?
3. Now suppose the calculated P-value is 0.14.
   1. What would the decision be?
   2. If this decision was incorrect, what type of error would this be?
   3. What would be a consequence of this error?
4. Which error is more serious – a Type I or Type II Error - in the Flint Water Crisis scenario? Explain.