Lab Problems 5-8

CHS Statistics 200
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5. The proportion of Americans who are vegetarian is reported to be 0.05. Is the proportion significantly different for Western PA high school students?

   (a) What variable or variables are involved? For each variable, tell whether it is quantitative or categorical.

   (b) **Before you even look at the data**, give a rough guess for the population proportion of students who are vegetarian _____. Then formulate null and alternative hypotheses to test if the population proportion is necessarily different from 0.05.
   H_0 :
   H_a :
   Do you suspect that there will be enough evidence to reject H_0?_____

   (c) Use **MINITAB Basics Example T**; first tally how many surveyed students are vegetarian; it's up to you whether you include only students who answered "yes" or if you add on students who answered "some." Find a 95% confidence interval for unknown population proportion. _____
   Test your hypotheses, making sure to opt for the correct alternative: the p-value

   is _____. Do you reject H_0?_____

   (d) **State your results**: since you did or did not reject H_0, what do you conclude about the unknown population proportion? Be sure to express your results specifically in terms of the variable(s) of interest, and mention to what extent the results match your suspicions in (b). Do you suspect it matters whether we count respondents as vegetarian only if they answer "yes," as opposed to counting them as vegetarian if they answer "yes" or "some?"

6. The numbers 1 to 20 have mean 10.5 and standard deviation 5.77. When students picked a number "at random" from 1 to 20, was there bias in favor of lower or higher numbers?

(a) What variable or variables are involved? For each variable, tell whether it is quantitative or categorical.

(b) Before you even look at the data, formulate null and alternative hypotheses about the population mean μ.

H_0 :

H_a :

Do you suspect that there will be enough evidence to reject H_0?_____

(c) Use **MINITAB Basics Example N** to carry out a z test, specifying σ and making sure to opt for the correct alternative ($<$, $\neq$, or $>$); include a display of the data. What is the p-value?_____

Do you reject H_0?_____

Give a 95% confidence interval for μ:_____

(Note: this was automatically provided if your alternative was $\neq$; otherwise, repeat the procedure, this time opting for a two-sided alternative.)

(d) **State your results**: since you did or did not reject H_0, what do you conclude about the unknown population mean? Be sure to express your results specifically in terms of the variable(s) of interest, and mention to what extent the results match your suspicions in (b).

7. Adults in the U.S. average 7 hours of sleep a night. Is this also the mean for the population of Western PA high school students?

   (a) What variable or variables are involved? For each variable, tell whether it is quantitative or categorical.

   (b) **Before you even look at the data**, formulate null and alternative hypotheses about the population mean μ.
   H_0 :
   H_a :
   Do you suspect that there will be enough evidence to reject H_0?_____

   (c) Note: When σ is unknown, you should carry out a test of your hypotheses using a t procedure, not z. Use **MINITAB** to carry out the one-sample t procedure, making sure to opt for the correct alternative ($<$, $\neq$, or $>$); include a display of the data. What is the p-value?_____
   Do you reject H_0?_____
   Give a 95% confidence interval for μ:_____[Note: this was automatically provided if your alternative was $\neq$; otherwise, repeat the t procedure, this time opting for a two-sided alternative.]

   (d) **State your results**: since you did or did not reject H_0, what do you conclude about the unknown population mean? Be sure to express your results specifically in terms of the variable(s) of interest, and mention to what extent the results match your suspicions in (b).

   (e) The survey question was worded, "How much time did you spend sleeping yesterday?" instead of "How much time did you spend sleeping last night?" Explain how the wording of the question could have affected the results of your hypothesis test.

8. Overall, is there a positive mean difference between the ages of students' fathers and mothers? (I suspect the fathers to be older.)

(a) What variable or variables are involved? For each variable, tell whether it is quantitative or categorical.

(b) **Before you even look at the data**, formulate null and alternative hypotheses about the population mean difference μ_d.
H_0 :
H_a :
Do you suspect that there will be enough evidence to reject H_0?_____

(c) Use **MINITAB Basics Example O** to carry out a paired-sample t procedure, making sure to opt for the correct alternative ($<$, $\neq$, or $>$); include a display of the data. What is the p-value?_____
Do you reject H_0?_____

(d) **State your results**: since you did or did not reject H_0, what do you conclude about the unknown population mean difference? Be sure to express your results specifically in terms of the variable(s) of interest, and mention to what extent the results match your suspicions in (b).

(e) Would we also use a paired procedure if we wanted to test if male and female students share the same mean age?