Name: _____

Lab Problems 5-8

Statistics 0200
Dr. Nancy Pfenning

5. The proportion of American adults who smoke is .25. Is the proportion significantly lower for university 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 smoke _____. Then formulate null and alternative hypotheses to test if the population proportion is necessarily less than .25.
   H_0 :
   H_a :
   Do you suspect that there will be enough evidence to reject H_0?_____

   (c) Use **MINITAB Basics Example S** to find the 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).

6. Verbal SAT scores are known to have standard deviation 111. Is the mean Verbal SAT score of all Stat students 580? (580 is presumably the mean score of all Pitt 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) 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 Stat 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).

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).