Name: _____ Lecture time (10, 11, or 12): _____

Lab Problems 5-10 (20 pts.)

Statistics 0200 Spring 2018 Dr. Nancy Pfenning

5. The proportion of college students who smoke is reported to be 0.20. Is the proportion significantly lower for students at this university?

   (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 less than 0.20.
   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. Writing SAT scores are assumed to have standard deviation 100. Is the mean Writing SAT score of all Stat students 610?

   (a) Tell whether the relevant variable 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) Tell whether the relevant variable 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).

9. Is mean age the same for male and female 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 difference $\mu_1 - \mu_2$ between population means for the two groups. [The null hypothesis usually states that this difference is zero.]
   H_0 :
   H_a :
   Do you suspect that there will be enough evidence to reject H_0?_____

   (c) Use **MINITAB Basics Example P** to carry out a two-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 difference between population means? 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).

10. In general, is mean income the same for 1st, 2nd, 3rd, 4th, and "other" year 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 means.
    H_0 :
    H_a :
    Do you suspect that there will be enough evidence to reject H_0?_____

    (c) Use **MINITAB Basics Example R** to carry out an ANOVA procedure; 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 various population means? 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).