

Name: \_\_\_\_\_

## Lab Problems 5-8 (worth 15 pts.)

Statistics 1000

Dr. Nancy Pfenning

5. Students were surveyed as to how many minutes they had exercised the day before. They were also asked whether or not they smoked.
- (a) If one group exercised more, would you expect it to be the
    - (i) smokers or the (ii) non-smokers?
  - (b) Use software to access the student survey data, and report the mean minutes exercised for smokers \_\_\_\_\_ and for non-smokers \_\_\_\_\_. Which sample mean is higher? \_\_\_\_\_
  - (c) Use software to carry out a (one-sided) test of the hypothesis that mean amount of exercise is the same for populations of smoking and non-smoking students. Which of these is relevant? (i) mean of differences (ii) difference between means. Report it. \_\_\_\_\_ Report the p-value. \_\_\_\_\_ Should the hypothesis of equality be rejected? \_\_\_\_\_

6. Is there a difference in mean hours slept for students in various years at college?

(a) Give at least one reason why students in earlier years may get more sleep.

(b) Give at least one reason why students in later years may get more sleep.

(c) Use software to access the student survey data, and report the mean hours of sleep for sampled students in each of the five year levels:

1st \_\_\_\_\_ 2nd \_\_\_\_\_ 3rd \_\_\_\_\_ 4th \_\_\_\_\_ Other \_\_\_\_\_

Which sample mean is highest? \_\_\_\_\_ Which is lowest? \_\_\_\_\_

(d) Use software to carry out the appropriate test; report the p-value. \_\_\_\_\_

(e) Two of these express the correct conclusions to draw, given the size of the p-value; which **two** are they?

- i. There is a relationship between students' year at school and how much sleep they get, for populations of students in the various years.
- ii. There is no relationship between students' year at school and how much sleep they get, for populations of students in the various years.
- iii. Mean amount of sleep may be equal for populations of students in the various years.
- iv. Mean amount of sleep is not equal for populations of students in any of the various years.
- v. Mean amount of sleep is not equal for populations of students in at least two of the various years.

7. A large sample of students was surveyed at a particular university; among other things, they were asked to report their weight, and how many minutes of television they had watched the day before.
- (a) Give at least two reasons why we may expect the relationship between weight and TV time to be positive.
  
  - (b) If weight is taken to be the explanatory variable, what would this be suggesting in particular about weight and TV time?
  
  - (c) If TV time is taken to be the explanatory variable, what would this be suggesting in particular about weight and TV time?
  
  - (d) Explain why gender should be taken into account as a possible confounding variable.
  
  - (e) Use software to separate out the weights and TV times of males from females. Regress weight on TV time for each gender group. For males, test against the **one-sided alternative**  $\beta_1 > 0$  and report the value of correlation  $r$  \_\_\_\_\_ and the p-value. \_\_\_\_\_. For females, test against the **one-sided alternative**  $\beta_1 > 0$  and report the value of correlation  $r$  \_\_\_\_\_ and the p-value. \_\_\_\_\_
  - (f) Although the correlations are practically identical, one of the p-values is considerably smaller than the other; what is the simplest explanation for how this came about?
  
  - (g) Do your regression results suggest that in general, watching more TV causes students to gain weight? \_\_\_\_\_ Explain.
  
  - (h) Do your regression results suggest that in general, students who watch more TV tend to weigh more? \_\_\_\_\_ Explain.

8. A large sample of students was surveyed at a particular university; among other things, they were asked to report their weight, and how many hours they had slept the night before.

- (a) Do you expect there to be a relationship between weight and sleep time? \_\_\_\_\_ If so, do you expect the relationship to be positive or negative?
  
- (b) If weight is taken to be the explanatory variable, what would this be suggesting in particular about weight and sleep time?
  
- (c) If sleep time is taken to be the explanatory variable, what would this be suggesting in particular about weight and sleep time?
  
- (d) Explain why gender should be taken into account as a possible confounding variable.
  
- (e) Use software to separate out the weights and sleep times of males from females. Regress weight on sleep time for each gender group. For males, test against the **one-sided alternative**  $\beta_1 > 0$  and report the value of correlation  $r$  \_\_\_\_\_ and the p-value. \_\_\_\_\_ For females, test against the **one-sided alternative**  $\beta_1 > 0$  and report the value of correlation  $r$  \_\_\_\_\_ and the p-value. \_\_\_\_\_
  
- (f) Do your regression results suggest that in general, students who sleep more tend to weigh more? \_\_\_\_\_ Explain.
  
- (g) Can we conclude that sleep time and weight are not related in children?