STT 231 HOMEWORK 1

DUE: MONDAY FEBRUARY 1\textsuperscript{ST} IN CLASS

SUBMISSION AFTER 12:50 PM ON FEBRUARY 1\textsuperscript{ST} IS SUBJECT TO 20\% POINT REDUCTION

SUBMISSION AFTER WEDNESDAY FEBRUARY 3\textsuperscript{RD} 12:40 PM WILL RESULT IN ZERO POINTS FOR THE HOMEWORK

INSTRUCTIONS:

1) SUBMIT YOUR ANSWERS IN THE SCANTRON PROVIDED IN CLASS.

2) USE PENCIL ONLY

2) ON THE SCANTRON, WRITE YOUR LAST NAME, FIRST INITIAL AND PID

3) PUT YOUR SIGNATURE IN THE SPACE PROVIDED
1. In order to determine if smoking causes cancer, researchers surveyed a large sample of adults. For each adult they recorded whether the person had smoked regularly at any period in their life and whether the person had cancer. They then compared the proportion of cancer cases in those who had smoked regularly at some time in their lives with the proportion of cases in those who had never smoked regularly at any point in their lives. The researchers found that there was a higher proportion of cancer cases among those who had smoked regularly than among those who had never smoked regularly. What type of study is this?

A) An observational study.
B) An experiment, but not a double-blind experiment.
C) A double-blind experiment.
D) A block design.

2. Many studies are trying to find a cure for chronic back pain. In one such study, a physician is comparing the medication currently being used (drug A) to a newly developed drug (drug B). Seventy-three volunteers, suffering from chronic back pain, are participating in this study. The physician’s assistant has a list of all 73 subjects and randomly divides the subjects into two groups. Group 1 will receive drug A and group 2 will receive drug B. The assistant is the only one who knows to which group the subjects have been assigned. The physician monitors the subjects over a 2 month period and the amount of improvement is recorded. What type of study is this?

A) An observational study.
B) An experiment, but not a double-blind experiment.
C) A double-blind experiment.
D) A matched-pairs experiment.
3. In order to assess the effects of exercise on reducing cholesterol, a researcher sampled 50 people from a local gym who exercise regularly and 50 people from the surrounding community who do not exercise regularly. Each subject reported to a clinic to have their cholesterol measured. The subjects were unaware of the purpose of the study, and the technician measuring the cholesterol was not aware of whether the subject exercises regularly or not. What type of study is this?

A) An observational study.
B) An experiment, but not a double-blind experiment.
C) A double-blind experiment.
D) A matched-pairs experiment.

4. A study is designed to determine whether grades in a statistics course could be improved by offering special review material. The 250 students enrolled in a large introductory statistics class are also enrolled in one of 20 lab sections. The 20 lab sections are randomly divided into 2 groups of 10 lab sections each. The students in the first set of 10 lab sections are given extra review material during the last 15 minutes of each weekly lab session. The students in the remaining 10 lab sections receive the regular lesson material, without the extra review material. The grades of the students who reviewed weekly were higher, on average, than the students who did not review every week. What type of study is this?

A) An observational study.
B) An experiment, but not a double-blind experiment.
C) A double-blind experiment.
D) A matched-pairs experiment.
5. Sickle-cell disease is a painful disorder of the red blood cells that in the United States affects mostly blacks. To investigate whether the drug hydroxyurea can reduce the pain associated with sickle-cell disease, a study by the National Institutes of Health gave the drug to 150 sickle-cell sufferers and a placebo to another 150. The researchers then counted the number of episodes of pain reported by each subject. What is the response variable in this study?

A) The drug hydroxyurea.
B) The number of episodes of pain.
C) The presence of sickle-cell disease.
D) The number of red blood cells.

6. Seventy-five college students are taking part in a study initiated by a large computer manufacturer. The company is designing a new type of laptop computer and has created prototypes of it with two different keyboard designs. They are also including the current design of the laptop in the experiment. Each of the students was randomly assigned to one of the three types of computers. The students are asked to spend 15 minutes on one of the computers performing several tasks (typing words, numbers, making corrections, etc.). The ease of use of the keyboard was then rated on a five-point scale by having the students fill out a short questionnaire. Which of the following basic principles of statistical design was not used in this experiment?

A) control
B) randomization
C) repetition
D) blinding
Use the following to answer questions 7 & 8: Twelve people, who suffer from chronic fatigue syndrome, volunteer to take part in an experiment to see if shark fin extract will increase one’s energy level. Eight of the volunteers are men and four are women. Half of the volunteers are to be given shark fin extract twice a day and the other half a placebo twice a day. We wish to make sure that four men and two women are assigned to each of the treatments, so we decide to use a block design with the men forming one block and the women the other.

7. For which reason is a block design appropriate in this experiment?
   A) Gender equity is an important legal consideration in this study.
   B) We believe men and women will respond differently to treatments.
   C) We want the conclusions to apply equally to men and women.
   D) All of the above.

8. Suppose one of the researchers is responsible for measuring if a subject displays an increase in energy level. What design principle should be added to this experiment?
   A) Two placebos.
   B) Use a stratified sampling design to assign subjects to treatments.
   C) Use fewer subjects but observe them more frequently.
   D) Conduct the study as a double-blind experiment.

Use the following to answer questions 9 & 10: A group of college students believes that herbal tea has remarkable restorative powers. To test its theory, the group makes weekly visits to a local nursing home, visiting with residents, talking with them, and serving them herbal tea. After several months, many of the residents are more cheerful and healthy.
9. What is the explanatory variable in this experiment?
   A) The emotional state of the residents.
   B) Herbal tea.
   C) The fact that this is a local nursing home.
   D) The college students.

10. What is the lurking variable in this experiment?
    A) The emotional state of the residents.
    B) Herbal tea.
    C) The fact that this is a local nursing home.
    D) Visits of the college students.

Use the following to answer questions 11 and 12: In a recent study, a random sample of children in grades 2 through 4 showed a significant negative relationship between the amount of homework assigned and student attitudes.

11. What type of study is this?
    A) An experiment.
    B) An observational study.
    C) The establishing of a causal relationship through correlation.
    D) A block design, with grades as blocks.
12. What type of variable is “the amount of homework assigned?”
   A) An explanatory variable.
   B) A response variable.
   C) A confounding variable.
   D) A lurking variable.

Use the following to answer questions 13 to 16: A study is conducted on students taking a statistic class. Several variables are recorded in the survey. Identify each variable as categorical or quantitative.

13. Type of car the student owns.
   A) Categorical
   B) Quantitative.

14. Number of credit hours taken during that semester.
   A) Categorical
   B) Quantitative.

15. The time the student waited in line at the bookstore to pay for his/her textbooks.
   A) Categorical
   B) Quantitative.
16. Home state of the student.

A) Categorical

B) Quantitative.

A pie chart of the departments in the school/college from which the 1100 sampled students graduated is shown below.

17. Based on the graph, (approximately) how many of the sampled students graduated with a degree in Building/Construction or Architecture?

A) 55

B) 59

C) 65

D) 99
Use the following to answer questions 18 & 19: A study is being conducted on air quality at a small college in the South. As part of this study, monitors were posted at every entrance to this college from 6 A.M. to 10 P.M. on a randomly chosen day. The monitors recorded the mode of transportation used by each person as they entered the campus. Based on the information recorded, the following bar graph was constructed.

18. Approximately what percentage of people entering campus on this particular day arrived by car?
A) 9%  
B) 31%  
C) 53%  
D) 62%

19. If 1200 people entered campus on this particular day, (approximately) how many people arrived by bus?
A) 10  
B) 100  
C) 120  
D) 135
Use the following to answer questions 20-25:

The time plot below gives the number of burglaries committed each month for a city in Ohio. The plot is for the three-year period January 1987–December 1989.

20. What is approximately the number of burglaries in December 1989, the last date recorded in the timeplot?
   A) 22  
   B) 27
   C) 32  
   D) 37

21. The number of burglaries in each month of 1988 was lower than the number of burglaries in each month of 1989. CHOOSE TRUE OR FALSE
   A) True  
   B) False

22. The median number of burglaries per month in 1988 was a little over 25. CHOOSE TRUE OR FALSE
   A) True  
   B) False
23. The total number of burglaries in 1989 was higher than in 1988. CHOOSE TRUE OF FALSE

A) True  B) False

24. The graph is bimodal. CHOOSE TRUE OF FALSE

A) True  B) False

25. What is approximately the maximum number of burglaries for a month in 1988?

A) 20  B) 25  C) 30  D) 35

**ANSWER KEY**