

**A.P. Statistics**  
**Assignment 3.9**

**Remember to show your thinking through your work.**

- 1) For the following situation, identify the explanatory and response variable. Then discuss what reservations (think cautions) you might have about the results of the experiment. Asking “What if...” type questions may help.

Do the high, centered brake lights (which have been required on all U.S. cars since 1986) really reduce the frequency of rear-end collisions? Randomized comparative experiments with fleets of rental and business cars, done before the lights were required, showed that the third brake light reduced rear-end collisions by as much as 50%. After the lights were required the drop was only 5%.

- 2) A psychologist is interested to know if meditation can help reduce stress in her patients. She randomly divided subjects into two groups. She taught one group how to meditate and they meditated daily for two months. The other group was told to relax more. At the end of the two month period, the psychologist interviewed all the subjects again and rated their stress. The meditation group had significantly less stress. Her colleagues said the results were rather suspect because the stress ratings were not blind. Explain what this means and how lack of blindness could bias the results.

3) Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as on the accuracy of your results and explanation

5. High cholesterol level in people can be reduced by exercise or by drug treatment. A pharmaceutical company has developed a new cholesterol-reducing drug. Researchers would like to compare its effects to the effects of the cholesterol-reducing drug that is currently available on the market. Volunteers who have a history of high cholesterol and who are currently not on medication will be recruited to participate in a study.

(a) Explain how you would carry out a completely randomized experiment for the study.

(b) Describe an experimental design that would improve the design in (a) by incorporating blocking.

(c) Can the experimental design in (b) be carried out in a double blind manner? Explain.

--

4) Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as on the accuracy of your results and explanation

2. Researchers who are studying a new shampoo formula plan to compare the condition of hair for people who use the new formula with the condition of hair for people who use the current formula. Twelve volunteers are available to participate in this study. Information on these volunteers (numbered 1 through 12) is shown in the table below.

Volunteer	Gender	Age
1	Male	21
2	Female	20
3	Male	47
4	Female	60
5	Female	62
6	Male	61
7	Male	58
8	Female	44
9	Male	44
10	Female	24
11	Male	23
12	Female	46

- (a) These researchers want to conduct an experiment involving the two formulas (new and current) of shampoo. They believe that the condition of hair changes with age but not gender. Because researchers want the size of the blocks in an experiment to be equal to the number of treatments, they will use blocks of size 2 in their experiment. Identify the volunteers (by number) that would be included in each of the six blocks and give the criteria you used to form the blocks.
- (b) Other researchers believe that hair condition differs with both age and gender. These researchers will also use blocks of size 2 in their experiment. Identify the volunteers (by number) that would be included in each of the six blocks and give the criteria you used to form the blocks.
- (c) The researchers in part (b) decide to select three of the six blocks to receive the new formula and to give the other three blocks the current formula. Is this an appropriate way to assign treatments? If so, describe a method for selecting the three blocks to receive the new formula. If not, describe an appropriate method for assigning treatments.