

AP StatisticsUnit 03 – Designing Experiments
Homework #4

Name _____

Period _____

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- 62.** Plan B. If the biologist uses Plan A, the brand that is assigned to the healthier plants might appear safer. However, we won't know if this is due to the brand or to the fact that these plants were healthier to begin with. With Plan B, the two groups of plants should be roughly equivalent at the beginning of the experiment so that a difference in response can be attributed to the type of weed killer.
- 66.** Assign the plots the labels 01 through 18. Write the labels on 18 identical slips of paper, put them in a hat, and mix them well. Draw out 6 slips. The corresponding plots will be in Group 1 and receive added water in winter. Draw out 6 more slips. These plots will be in Group 2 and receive added water in spring. The remaining 6 plots will be in Group 3 and receive no extra water. At the end of the experiment, record the total plant biomass for each plot and compare the results for the 3 groups.
- 67.** **a)** Other variables include expense and condition of the patient. For example, if a patient is in very poor health, a doctor might choose not to recommend surgery because of the added complications. Then we won't know if a higher death rate is due to the treatment or the initial health of the subjects.
- b)** Write the names of all 300 patients on identical slips of paper, put them in a hat, and mix them well. Draw out 150 slips and assign the corresponding subjects to receive surgery. The remaining 150 subjects receive the new method. At the end of the study, count how many patients survived in each group.
- 69.** The subjects developed rashes on the arm exposed to the placebo (a harmless leaf) simply because they thought they were being exposed to a poison ivy leaf. Likewise, most of the subjects didn't develop rashes on the arm that was exposed to poison ivy because they didn't believe they were being exposed to the real thing.
- 75.** **a)** The different diagnoses, because the treatments were randomly assigned to patients within each diagnosis.
- b)** Using a randomized block design allows us to account for the variability in response due to differences in diagnosis by initially comparing the results within each block. In a completely randomized design, this variability will be unaccounted for, making it harder to determine if there is a difference in health and satisfaction due to the difference between doctors and nurse-practitioners.

- 78.** **a)** A randomized block design would help us account for the variability in weight loss that is due to the differences in initial weight, making it easier to determine if one diet plan is better than the others.
- b)** How overweight the subjects are. There should be a stronger association between amount overweight and future weight loss than last name and future weight loss.
- c)** Ordered by increasing weight, the five blocks are
(1) Williams-22, Deng-24, Hernandez-25, and Moses-25
(2) Santiago-27, Kendall-28, Mann-28, and Smith-29
(3) Brunk-20, Obrach-30, Rodriguez-30, and Loren-32
(4) Jackson-33, Stall-33, Brown-34, and Cruz-34
(5) Birnbaum-35, Tran-35, Nevesky-39, and Wilansky-42
For each block, number the subjects 1 to 4. At the beginning of Table D (or Table B)
- 79.** **a)** If all rats from Litter 1 were fed diet A and if these rats gained more weight, we would not know if this was because of the diet or because of genetics and initial health.
- b)** Use a randomized block design with the litters as blocks. For each of the litters, randomly assign half of the rats to receive Diet A and the other half to receive Diet B. This will allow researchers to account for the differences in weight gain caused by the differences in genetic and initial health.
- 82.** **a)** Matched pair design.
- b)** In a completely randomized design, the differences between the volunteers will add variability to the response, making it harder to detect if there is a difference caused by the treatments. In a matched pairs design, each volunteer is compared with himself (or herself), so the differences between volunteers are accounted for.
- c)** If the weather is warmer on one of the days, we won't know if the difference in blood vessel function is due to the difference in treatment or the difference in weather. By randomizing the order, some volunteers will have the bittersweet chocolate on the warmer day and some will have it on the colder day.
- d)** The method of measurement and the total amount of chocolate were kept the same for all subjects, preventing these variables from adding variability to the response variable.