Answers - Unit 5 Review AP Statistics

1. B 2. B 3. B 4. A 5. C 6. A

7. D 8. C 9. B 10. E 11. C 12. C

13. E 14. D 15. B 16. C 17. A 18. D

19. C 20. E 21. D

Part II

1) The doctors probably did not understand the placebo effect. We know that, sometimes, a real effect can occur even from a placebo. If people believe they are receiving a real treatment, they will often show a change. But without a control group, we have no way of knowing if the improvement would not have been even more significant with a real treatment. The *difference* between the placebo score and the treatment score is what is important, not one or the other.

2) Since proximity to the window is a confounding variable, block for nearness to the window by assigning each of the four rows to a different block. There may be some left-right variation within each row, so stratifying may help by assigning the treatment fertilizer to the odd-numbered containers and the control fertilizer to the even-numbered containers. For each row, randomly select one of each type of plant and randomly assign it to the odd-numbered containers. For each row, randomly select one of each type of plant and randomly assign it to the even-numbered containers. Repeat the process for each row. Blocking helps control the effects of sun and heat near the window. Randomization controls variation in containers caused by chance.

		WINDOW			
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

3)

(a) Many answers are possible. One solution involves putting the names of all 60 students on slips of paper, then randomly selecting the papers. The first student goes into program 1, the next into program 2, etc. until all 60 students have been assigned.

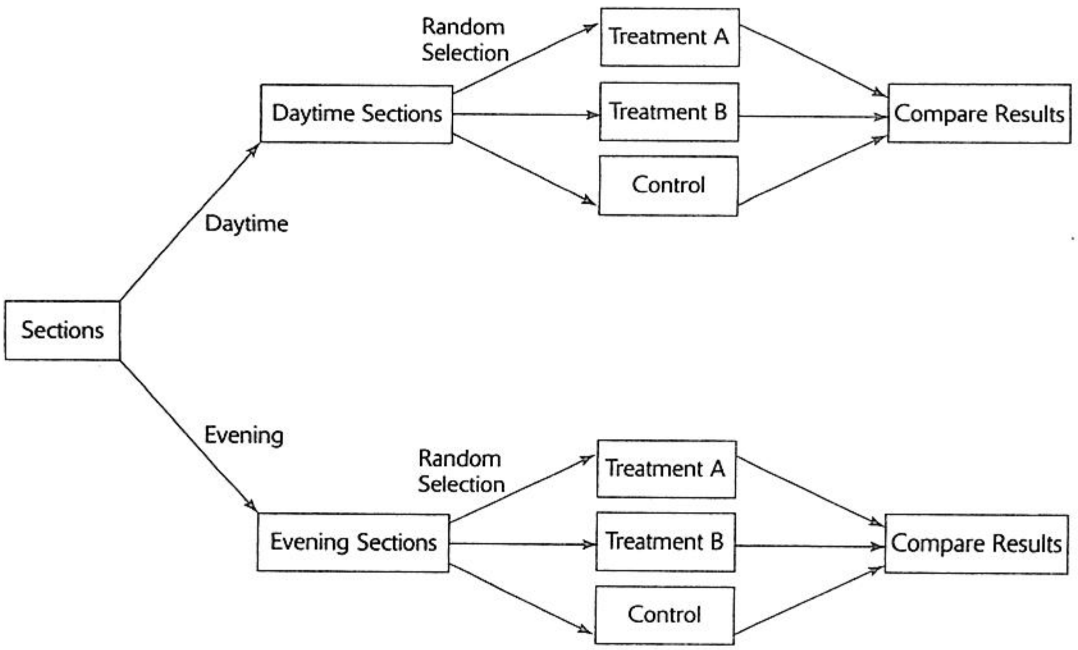
(b) Use a random number generator to select integers from 1 to 3 (like `randInt(1,3)`) on the TI-83/84 or use a table of random numbers assigning each of the programs a range of values (such as 1–3, 4–6, 7–9, and ignore 0). Pick any student and generate a random number from 1 to 3. The student enters the program that corresponds to the number. In this way, the probability of a student ending up in any one group is 1/3, and the selections are independent. It would be unlikely to have the three groups come out completely even in terms of the numbers in each, but we would expect it to be close.

4)

This is an observational study. The researcher (restaurant owner) did not control anything. No treatment was imposed on any subject. Each customer made his own decision as to which group to be in, drinker or nondrinker. Although drinkers spent considerably more money than nondrinkers, it might or might not be significant; random variation might have caused the differences. Repeating the experiment in other restaurants, locations, and months of the year would reinforce the results.

5)

Divide the 15 sections into the 9 daytime sections and the 6 evening sections. Use a random number table, or some other technology tool, to randomly select 3 of the 9 daytime sections to receive treatment A (females do better than males). Randomly select 3 to receive treatment B (males do better than females), and select the remaining 3 to be the control and not be told anything about gender performance differences. Randomly select 2 of the 6 evening sections to receive treatment A (females do better than males). Randomly select 2 to receive treatment B (males do better than females), and select the remaining 2 to be the control and not be told anything about gender performance differences. This is a single-blind design. Do not tell the students about the experiment. By dividing the sections into day and evening sections, you are blocking by time. You are randomizing within each block. Two treatments and a control are used. Compare the results.



6) In this situation, a *stratified random sample* would be a sample in which the proportion of teachers from each of the four levels is the same as that of the population from which the sample was drawn. That is, in the sample of 100 teachers, 10 should be from level A, 15 from level B, 45 from level C, and 30 from level D. For level A, she could accomplish this by taking an SRS of 10 teachers from a list of all teachers who teach at that level. SRSs of 15, 45, and 30 would then be obtained from each of the other lists.

7) In a double-blind experiment, neither the subjects nor the researchers know to which group subjects have been assigned. Blind design for the subjects is important to control the placebo effect. In this experiment, blind design should also be used with respect to the researchers. For objective measurement, such as lab work on blood samples, blinding is not as important since researchers are simply recording factual data. For subjective measurements, such as how subjects are feeling, how they look, or how fast they respond to questions, blinding is very important. If a researcher knows what treatment a subject is receiving, their expectation of success or failure could interfere with their interpretation of subjective information.

8) Identify 300 volunteers for the study, preferably none of whom have been taking vitamin C. Randomly split the group into two groups of 150 participants each. One group can be randomly selected to receive a set dosage of vitamin C each day for a month and the other group to receive a placebo. Neither the subjects nor those who administer the medication will know which subjects received the vitamin C and which received the placebo (that is, the study should be *double blind*). During the month following the giving of pills, you can count the number of colds within each group. Your measurement of interest is the difference in the number of colds between the two groups. Also, placebo effects often diminish over time.