Name:_____

AP Statistics Assignment 5.2 Experimental Design and Random Selection

1. When illustrating the map of an experiment, what are some things that you must have?

2. What is blocking? What is the purpose of "blocking" when designing an experiment? Explain:

3. Draw a map of the how an experiment would be designed for each of the scenarios below:

a) A drug is to be tested for it's effects on pancreatic cancer. 15000 patients with pancreatic cancer were selected and they are to be treated with 20mg of the drug either daily, hourly, or weekly.

b) The drug mentioned above is to be tested with patients in different stages of pancreatic cancer. They are divided into "stage 1", stage 2", "stage 3", and "stage 4". The treatments are the same as mentioned above

c) A group of scientists discovered a type of insulin that could reverse the effects of diabetes when used with Tylenol or Advil. 3000 volunteers with type 2 diabetes. Explain how you would design an experiment on the effects of this drug when used in combination with another as mentioned.

d) When playing a video game that you like, young teenagers release dopamine in their brains. Scientist worry that constant release of dopamine would lead to negative effects in the brain, causing mental illness. Ten thousand high school students were selected to study the effects of video games on the brain. How would you design this study?

e) Does having Honors classes affect the learning of students. In UBC, four first year engineering classes were selected to study the impact of honors on first year students. One of the classes is honors and the other three are not. All four classes are taught by the same faculty member. How would you design this experiment?

4. When should you use blocking in an experiment? Explain how you would use blocking in each of the scenarios mentioned in question 3.

5. A medical study of heart surgery investigates the effect of a drug called a beta-blocker on the pulse rate of the patient during surgery. The pulse rate will be measured at a specific point during the operation. The investigators will use 20 patients facing heart surgery as subjects. You have a list of these patients, numbered 1 to 20, in alphabetical order.

a) Describe the design of a completely randomized experiment to test the effect of beta-blockers on pulse rate during surgery. Write a few sentences about how you would implement your design.

b) Use the section from the random digits table below to carry out the randomization required by your design and report the result.

96746	12149	37823	71868	18442	35119	62103	39244
96927	19931	36809	74192	77567	88741	48409	41903
43909	99477	25330	64359	40085	16925	85117	36071
15689	14227	06565	14374	13352	49367	81982	87209
36759	58984	68288	22913	18638	54303	00795	08727

6. As you age, walking briskly for 30 to 60 minutes a day can help keep the pounds away? John Jakicic, director of the University of Pittsburgh's Physical Activity and Weight Management Research Center, and colleagues recruited 209 adults, average age 45, who were about 15 to 29 pounds overweight. Participants were divided into three groups. The first group was given general exercise guidelines, which recommend up to 30 minutes of moderate activity daily. A second group was advised to be physically active for at least 150 minutes a week, or about 30 minutes five days a week, and received weekly classes on how and why exercise is important. The third group was told to exercise 300 or more minutes a week, roughly 45 to 60 minutes a day. They also attended behavior classes. All participants were advised to eat a healthy diet but told not to restrict their calories. About 75% chose to walk for exercise.

A) Outline the study that the researchers carried out.

b) Comment on any weaknesses of the study that you see.

c) Jakicic's group reported that at the end of 18 months:

- 40% of participants gained weight, an average of 7 pounds. Those most likely to gain were people who did not exercise regularly.
- 60% lost weight, an average of 7 pounds. These were people in any of the three groups who did about 40 minutes of activity seven days a week.

Jakicic said, "This is a weight difference of 14 pounds between people who exercised and those who didn't." Can walking about 40 minutes a day, five days a week, explain the weight loss, or are there lurking variables that might also help explain the weight loss?