Homework: Randomization and blocking

1. A researcher wishes to study the effects of 2 types of preservatives (BHA, BHT) at two amounts (100, 400) on the growth of bacteria in meats. There are 16 identical samples of meat to which the treatments may be applied.

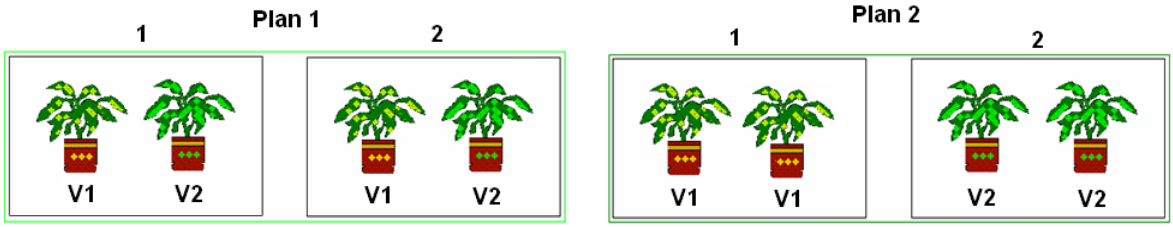
a. How many treatments are there?

b. What are the experimental units?

c. Show an example of how you would assign the experimental units to the treatments in a completely random design.

d. Suppose the samples of meat are hamburger and the samples come from 4 different batches. How would this affect the randomization you would use?

2. A horticultural scientist wishes to compare the growth of two varieties tropical plants V1 and V2. The plants are to be placed in growth chambers where the temperature can be controlled. Two growth chambers are available for the study. There are two plans being considered. In Plan 1, both varieties are placed in each grown chamber. In Plan 2, one variety is placed in one growth chamber and the over variety is placed in the other growth chamber. The growth chambers are made by the same company and except for age are identical. A picture is shown below. Which plan is preferable and why?



3. An engineer is interested in changing the air flow of a commercial freezer to see how this affects the amount of time it takes to freeze a batch of pizzas. The air flow is set to "high" in the morning and 10 batches of pizzas are run through the freezer. In the afternoon, the air flow is set at "low" and another 10 batches of pizzas are run through the freezer.

a. What possible biasing factors are there that could affect the validity of this experiment?

b. How would you redesign the experiment to mitigate the effect of the biasing factors?