

1. In the mornings, it takes Ms. Arvelo an average of 41.6 minutes to commute from her home to school, with a standard deviation of 4.5 minutes. On average, Ms. Arvelo takes 47 minutes to prepare to leave her house each morning from the time she wakes up, with a standard deviation of 5.37 minutes. On any given day, what is the probability that Ms. Arvelo will arrive at school within 90 minutes of waking up? Assuming that both stated distributions are Normal. Show all work.

2. Ms. Mizzi likes to make small origami boxes for giving gifts. With the new paper she bought, the square bottoms measure an average of 3.044 inches per side, with a standard deviation of 0.1873 inches. The square tops measure an average of 3.548 inches per side, with a standard deviation of 0.1896 inches. If the top is less than 0.2 inches larger than the bottom, it will not fit. Likewise, if the top is more than 0.8 inches larger than the bottom, it will also not fit. Ideally it should be 0.5 inches larger than the bottom. What is the probability that Ms. Mizzi will construct a box where the top fits the bottom? Assuming that both stated distributions are Normal. State the assumptions you are making to answer this question and show all work.

3. High cholesterol level in people can be reduced by *exercise* or 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 the study.

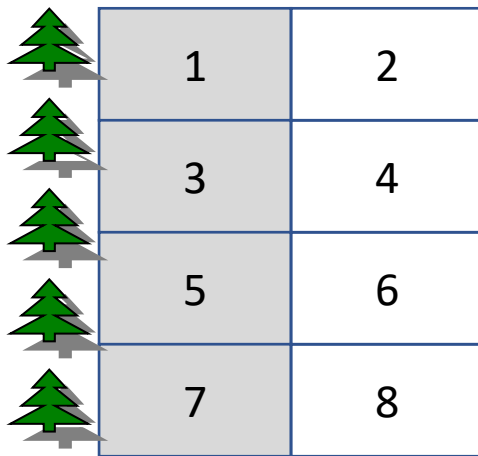
a. Explain how you would carry out a completely randomized experiment for the study. Include a diagram and a couple of sentences.

b. Describe an experimental design that would improve the design in (a) by incorporating blocking. Explain why you blocked by the variable you selected. Include a diagram and a couple of sentences.

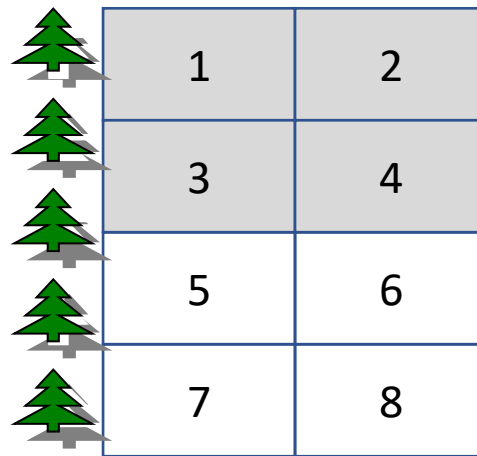
c. Can the experimental design in (b) be carried out in a double blind manner? Include the definition of “double blind” in your explanation.

4. Students are designing an experiment to compare the productivity of 2 varieties of dwarf fruit trees. The site for the experiment is a field that is bordered by a densely forested area on the west (left) side. The field has been divided into 8 plots of approximately the same area. The students have decided that the test plots should be blocked. Four trees, two of each of the 2 varieties, will be assigned at random to the four plots within each block, with one tree planted in each plot.

The two blocking schemes shown below are under consideration. For each scheme, the white region indicates one block and the gray region in the figure indicates the other block.



Scheme A



Scheme B

a. Which of the blocking schemes, A or B, is better for this experiment? _____ Explain your answer.

b. Even though the students have decided to block, they must randomly assign the varieties of trees to the plots within each block. What is the **purpose** of this randomization in the **context** of this problem?