Group Activity

Your group (it is best if you have 4 people in your group) will need a pair of 10-sided dice and a sheet of 100 random rectangles. You should **NOT** study the sheet of random rectangles. The random rectangles represent a generic population of values. The areas of the rectangles could represent the numbers of people in households or the numbers of hours per week students spend on STAT 301. What we wish to investigate in this activity is what can be learned about the area of the rectangles using sampling techniques.

1. Each individual in the group should look at the sheet of random rectangles for a few seconds and guess the average area of the rectangles on the sheet. The unit of measure is the background square. Thus rectangle 7 has area $4 \times 3 = 12$. Compare your guess with those of the other members in your group. Discuss why you got different guesses. Record the individual guesses on your group data sheet. There should be one guess for each member of your group.

2. Each individual should now select five rectangles that, in her/his judgment, are representative of the rectangles on the sheet. Write down the area for each of the five. Compute the average of the five areas. How does this compare with your guess? How does it compare with the averages of the judgment samples for the other members of your group? Again discuss why you got different averages. Record the judgment sample averages on your group data sheet. There should be one judgment sample and average for each member of your group.

3. We want to take a random sample from the 100 rectangles. We could cut out the rectangles, laminate them, put them in a bag, mix thoroughly and draw from the bag. Do you think this would give you a random sample? Explain briefly.

4. Each individual should use the ten-sided dice to generate 5 random numbers between 00 and 99. Find rectangles with these numbers, using 00 to represent rectangle 100. This is a simple random sample of 5 rectangles. Compute the average area for your random sample. How does it compare with your guess and your judgment sample average? Record the random sample averages on your group data sheet. There should be one random sample and average for each member in your group.

5. If you select 5 new random numbers will you come up with the same average area? Explain briefly.

6. Which do you think will provide a better guess of the true average area of the 100 rectangles, the random sample average of 5 rectangles or the random sample average of 20 rectangles? Explain briefly.

7. Choose at random one of your group’s random sample averages of 5 rectangles. Use the 20 random integers generated by JMP to calculate the average value for a random sample of 20 rectangles. Compare these to the true mean of the 100 rectangles. Which comes closest to the true mean?
Record your group member's names, guessed values, judgment samples and averages and random sample and averages in the table below.

<table>
<thead>
<tr>
<th>Name</th>
<th>Guess</th>
<th>Judgment Sample #’s:</th>
<th>Judgment Sample Mean Area</th>
<th>Judgment Sample Areas:</th>
<th>Random Sample #’s:</th>
<th>Random Sample Mean Area</th>
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1. Why did you get different guessed values?

2. Why did you get different judgment samples and averages?

3. Will drawing laminated rectangles from a bag provide a random sample? Explain briefly.
4. How do the averages of the random samples compare to the averages of the judgment samples and the guesses for your group?

5. Will a new random sample produce the same sample average? Explain briefly.

6. Which is a better estimate of the population mean, the average of 5 or the average of 20 randomly selected rectangles? Explain briefly.

7. Which came closer to the population mean, your random sample average of 5 rectangles or the random sample average of 20 rectangles? Does this agree or disagree with your answer in 6? Explain briefly.

The true population mean is ________.