"Struck by Lightning" Supplementary Materials

Group Exercise about Pseudorandom Number Generators

Working cooperatively with your group, consider the following methods of generating a "random" sequence of numbers between 0 and 99.

Method #1: First, start with a "seed" value equal to your group number (where Ace = 1). Write this value on a piece of paper. Then, update your value using the following three steps:

1. Multiply the value by 21.

2. Add 7 to the value.

3. Take just the last two digits of the value (i.e., take the remainder when the value is divided by 100, i.e. compute the value "mod 100").

(Example: if your original value was 8, then 21 x 8 = 168, and 168 + 7 = 175, and the last two digits of 175 are 75, so your new number would be 75.)

Then, repeat steps 1–3 starting with your new number, to obtain yet another number between 0 and 99. Continue this process, writing each new value on your paper, to get a sequence of 20 different numbers between 0 and 99.

Method #2: Start with the same seed value as you did in Method #1, again equal to your group number. Update your value using the following three steps:

1. Multiply the value by 2121.

2. Add 777 to the value.

3. Take just the last <u>four</u> digits of the value (i.e., compute the value "mod 10000").

(Example: if your original value was 8, then 2121 x 8 = 16968, and 16968 + 777 = 17745, and the last four digits of 17745 are 7745, so your new number would be 7745.)

Then, repeat steps 1–3 starting with your new number, to obtain another number between 0 and 9999. Continue this process, to get a sequence of 20 numbers different numbers between 0 and 9999.

<u>After</u> you have obtained your list of 20 different numbers, then make a new list of <u>just the first two digits</u> of each of the 20 numbers, to generate 20 new values between 0 and 99. (Example: if your number is 7745, the new value is 77.)

Questions: Look at your two sequences of numbers. Do they "appear" to be random? Why or why not? Discuss. (You may wish to consider such issues as patterns, predictability, average value, spread of values, repeat values, sequential correlation, etc. Try to consider as many different issues as you can.) For generating random values between 0 and 99, which do you think is better, Method #1 or #2? Why?