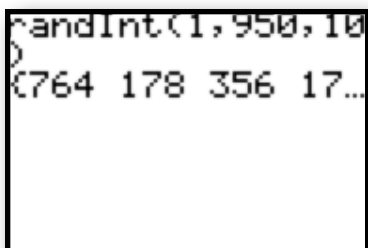

Chapter 5: Producing Data

5.1-5.2 Designing Samples and Experiments

In Chapter 5 of YMS, we are introduced to the second major theme in AP Statistics--Collecting/Producing Data. There is not a lot we need to do on our calculators in this chapter. However, they can come in handy when selecting simple random samples. Rather than relying on a table of random digits, we can use the pseudo-random generator in the calculator to select a sample.

1. Number the individuals in the population you wish to sample from 1 to n .
2. Push **MATH** **PRB** **5:randInt(**
3. Execute **randInt(1,n, sample size)**



```
randInt(1,950,10)
{764 178 356 17...
```

For example, suppose I wanted to select an SRS of 10 individuals from a population of size 950. I would number each individual from 1 up to 950, then execute **randInt(1,950,10)**



```
MATH NUM CPX PRB
1:rand
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(
```

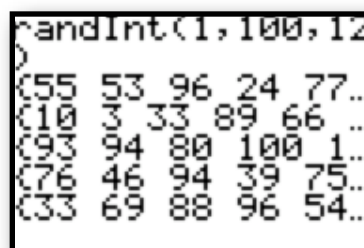
Scrolling to the right will show the rest of the randomly selected numbers. Note: repeats are possible, so you may want to select more than 10 and then take the first 10 non-repeated numbers.

This process can also be used to randomize in experimental design. Executing **randInt(1,2)** can be used to simulate flipping a coin to split individuals in to two experimental groups or repeating the process above can be used to randomly select a treatment group.

5.3 Simulating Experiments

In some cases, actually carrying out an experiment can be slow, costly, or logistically difficult. We can use a probability model and our TI to calculate a theoretical answer for some situations. The key to using the calculator is to start with a well-defined model that reflects the the situation we are studying. For example, suppose 90% of passengers show up for a given flight. To ensure flights are as full as possible, airlines often overbook, hoping some passengers don't show up and all who do get a seat. What is the probability a 10 seat plane will be overbooked if 12 tickets are sold?

1. Define a probability model.
 - Select a number between 1 and 100.
 - 1-90 = show up for the flight
 - 91-100 = "no show"
2. Draw 12 random numbers between 1 and 100.
3. Count the "no shows"
4. Keep track of overbooked vs. ok
5. Repeat the process and estimate the probability.



```
randInt(1,100,12)
{55 53 96 24 77...
{10 3 33 89 66 ...
{93 94 80 100 1...
{76 46 94 39 75...
{33 69 88 96 54...
```

AP[®] Examination Tips

When taking the Advanced Placement Statistics Exam, you will most likely be asked to design an experiment or answer questions related to a sampling process or

When describing randomization:

- Be complete when describing the process used to select a sample or determine experimental groups...DO NOT simply write the calculator command you used. For example, write "*I numbered the individuals from 1-20 and used a random generator to select 5 for my sample.*" NOT "*I typed randInt(1,20,5)*"
- Make sure you understand WHY we randomize in survey situations or experimental design.

When simulating an experiment:

- Define your probability model. That is, indicate what numbers stand for what situations. For example, write "*To simulate choosing individuals from a pool in which 70% are employed, I will randomly select numbers between 1 and 100. 1-70 represent employed individuals while 71-100 represent unemployed individuals.*"
- Repeat the simulation a number of times and keep track of your results so you can calculate the theoretical probability.

