

## 4

## Sample Surveys and Experiments

**Calculator Note 4A: Generating Random Numbers**

You can generate random numbers using commands in the MATH menu. For example, to generate random integers between 0 and 99, press **MATH**, arrow over to PRB, select 5:randInt(), and enter the expression randInt(0,99). Pressing **ENTER** repeatedly generates more random integers.

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

```
randInt(0,99)
90
19
47
47
63
```

If you enter randInt(0,99,5), the calculator returns 5 random integers randomly selected between 0 and 99. However, the calculator may generate the same number twice. So if you're looking for 5 distinct integers, you'll need to decide how to deal with this.

```
randInt(0,99,5)
(54 28 20 78 77)
```

This table provides a complete listing of the random number generators available on the TI-83 Plus and TI-84 Plus. The random number commands are found by pressing **MATH** and arrowing over to PRB. [ ] indicates an optional parameter.

Command	Meaning	Syntax
rand	Generates a random number between 0 and 1.	rand[ <i>number of trials</i> ]
randInt(	Generates a random integer between <i>a</i> and <i>b</i> , inclusive.	randInt( <i>a</i> , <i>b</i> ,[ <i>number of trials</i> ])
randNorm(	Generates a random number from a normal distribution with a specified mean and standard deviation.	randNorm( <i>mean</i> , <i>standard deviation</i> , [number of trials])
randBin(	Generates a random number from a binomial distribution with <i>n</i> trials with <i>p</i> probability of success.	randBin( <i>n</i> , <i>p</i> , [number of simulations])

## Calculator Note 4B: Simulating Sampling Without Replacement

To select from a list of values without replacement, follow these steps.

1. Enter your list of values into list L1. You may need to code data as numbers. For example, if you have 3 red marbles, 2 blue marbles, and 6 green marbles, you might specify red = 1, blue = 2, and green = 6 and enter {1, 1, 1, 2, 2, 3, 3, 3, 3, 3, 3} into L1.

L1	L2	L3	1
1	-----	-----	
1			
1			
1			
2			
2			
3			
3			
3			
3			
3			
3			
L1={1, 1, 1, 2, 2, 3, 3, 3, 3, 3, 3}			

2. Generate a list of random numbers in list L2. This list must have the same number of elements as list L1. You can use the command `rand(dim(L1))`. Press **[2ND]** [LIST] and arrow over to OPS to find `dim(`. Press **[MATH]** and arrow over to PRB to find `rand`.

<code>rand(dim(L1))→L2</code>			
(.270630994 .88...			
L1	L2	L3	1
1	.27063	-----	
2	.88858		
1	.20036		
0	.82101		
0	.31015		
2	.25151		
2	.22251		
2	.33236		
L1()=3			

3. Sort list L2, with list L1 values remaining associated with the newly sorted L2 values. To do this, enter `SortA(L2,L1)` on the Home screen. Find `SortA(` by pressing **[2ND]** [LIST], arrowing over to OPS, and selecting 1:SortA(.

<code>SortA(L2,L1)</code>			
Done			
L1	L2	L3	1
1	.1085	-----	
1	.11239		
1	.30382		
1	.32827		
1	.42606		
2	.49632		
2	.49632		
2	.64661		
L1()=2			

4. Read off the number of values needed from list L1.

### Using the SELECT Program

You can perform a similar process with the program SELECT. Be sure your data set is entered in list L1. The program will prompt you to enter how many data values you wish to select in your sample (without replacement) and how many times you wish to perform the simulation. When the program has finished running, you'll see the last sample in list L2, and list L4 will display the mean of every sample.

```

PROGRAM: SELECT
ClrList L2,L3,L4
Disp "SAMPLE SIZE"
Prompt N
Disp "NUMBER OF SAMPLES"
Prompt S
For(I,1,S)
  se1(rand,X,1,dim(L1))→L2
  SortA(L2,L1)
  For(J,1,N)
    L1(J)→L3(J)
  End
  mean(L3)→L4(I)
End
  
```