

## Using The TI-83 to Construct a Discrete Probability Distribution

You can use the TI-83 calculator to construct a discrete probability distribution as well as find the mean (expected value) and standard deviation of a discrete random variable.

Example: The manager of the Elmwood Café has a staff of six wait-persons on weekend evening shifts. For a period of 50 days she has recorded the number of these employees who called in sick. The results are given in the table below. In this problem  $x$  = number who call in sick. The frequency is the number of days  $x$  people call in sick.

$x$	0	1	2	3	4
Frequency	30	10	5	3	2

Hit STAT and then select EDIT (#1). Enter the random variable  $x$  in  $L_1$  and the frequency  $f$  in  $L_2$ .

$L_1$	$L_2$	$L_3$	2
0.000	30.000	-----	
1.000	10.000		
2.000	5.000		
3.000	3.000		
4.000	2.000		
-----	-----		
$L_2(6) =$			

Put your cursor at the top of  $L_3$  and compute the probability of each possible outcome by dividing its frequency by the sum of the frequencies (sample size,  $n$ ).

$L_1$	$L_2$	$L_3$	3
0.000	30.000	-----	
1.000	10.000		
2.000	5.000		
3.000	3.000		
4.000	2.000		
-----	-----		
$L_3 = L_2 / 50$			

Hit ENTER and now  $L_3$  shows the probability of each possible outcome (the  $P(x)$ ). You have created a discrete probability distribution for the random variable  $x$ .

$L_1$	$L_2$	$L_3$	3
0.000	30.000	.600	
1.000	10.000	.200	
2.000	5.000	.100	
3.000	3.000	.060	
4.000	2.000	.040	
-----	-----	-----	
$L_3(1) = .6$			

To find the mean (expected value) and standard deviation, hit the STAT key, highlight CALC using the arrow keys and then select the 1-VAR STATS option (#1). Then enter L<sub>1</sub>, L<sub>3</sub>. Remember L<sub>1</sub> is the random variable x and L<sub>3</sub> is the P(x).

```
1-Var Stats L1,L
3
```

Hit ENTER and the results are shown.

```
1-Var Stats
x̄=.740
Σx=.740
Σx2=1.780
Sx=
σx=1.110
↓n=1.000
█
```

The mean (expected value) is 0.740 and the standard deviation is 1.11

Note: If you are already given the probability for each outcome, P(x), you can put them in L<sub>2</sub> and compute the mean and standard deviation using the 1-VAR STATS option with L<sub>1</sub> and L<sub>2</sub> as your data.