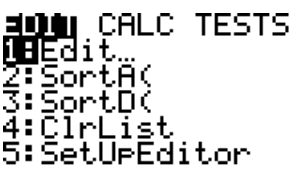
Statistics and Distributions on the TI-83/84

The TI-83/84 family of graphing calculators comes equipped with many statistics functions, from simple computations to complex tests. We will discuss in this handout several distributions commonly used in statistics courses. The steps below are nearly identical across all TI-83's and TI-84's with two exceptions. First, this handout focuses on the TI-83 Plus and higher. If you are using the original TI-83 (without "Plus" in the title) then the keyboard layout is slightly different; you may need to modify the directions on this handout accordingly. Second, the latest update to the TI-84 (currently version 2.55MP) introduced a Statistics Wizard, which greatly simplified the usage of many statistics functions. To find out if your TI-84 has the latest update, press [2nd] → [+] for "MEM" → [ENTER] for the "About" screen. The version number will be under "TI-84 Plus". Press [2nd] → [MODE] for "QUIT" to exit back to the Home screen.

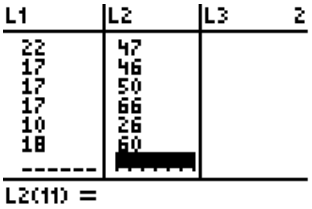
Most of the directions on this handout present a side-by-side comparison between different versions of the TI-83/84 graphing calculator family. Simply follow the screenshots that match your device. Also, the menus shown in the screenshots will differ slightly between the TI-83 and TI-84. For compatibility reasons, most of these screenshots were captured from the TI-83 Plus.

Entering and Editing Data in a List ALL

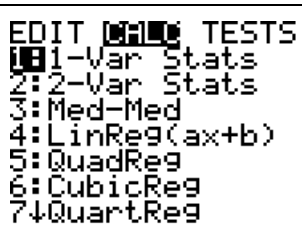
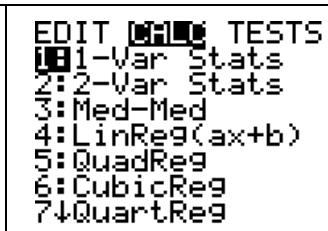
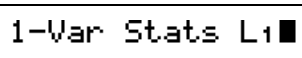
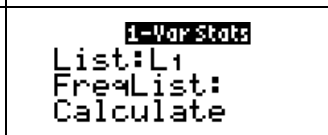
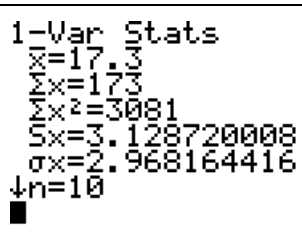
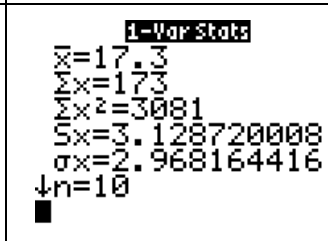
We input or edit data in the calculator via the List Editor. Press [STAT] to enter the Statistics menu, then press [ENTER] for "Edit…".



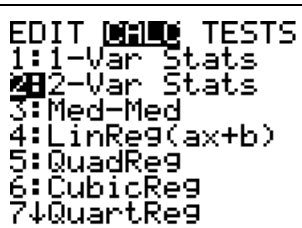
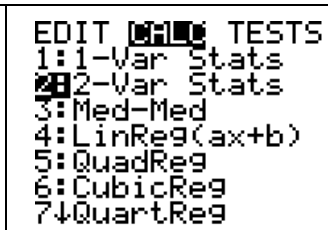
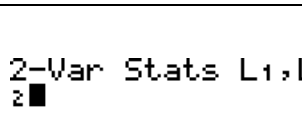
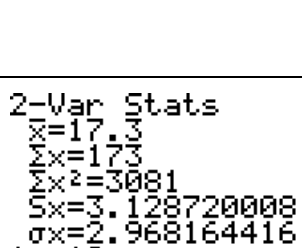
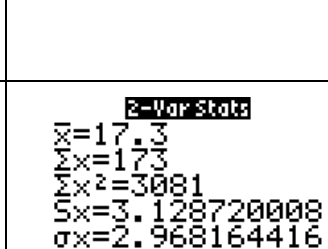
We will be using two lists of values for this example and the next two.
Enter into the first list (L_1) the values 16, 20, 17, 19, 22, 17, 17, 17, 10, and 18 by typing each number and then pressing [ENTER]. That is, 16 → [ENTER] → 20 → [ENTER] …
Press the [▶] key to scroll over to the second list. As with L_1, enter the values 45, 55, 70, 50, 47, 46, 50, 66, 26, and 60 into L_2. You should now see the screen on the right. To exit the List Editor, press [2nd] → [MODE] for "QUIT".



One-Variable Statistics

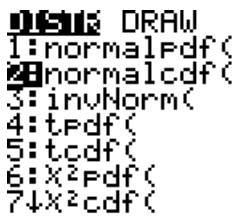
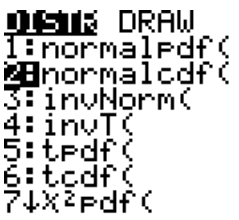
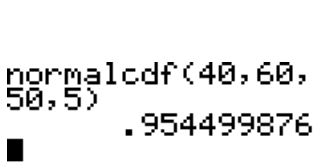
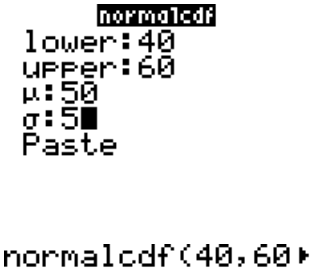
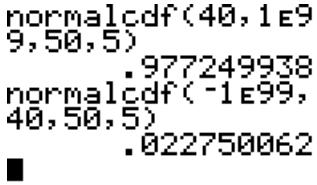
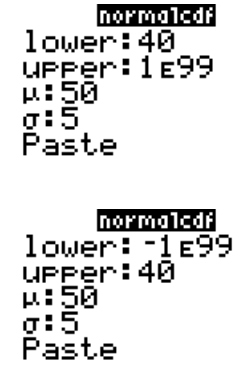
	TI-83, TI-84 (2.53MP AND LESS)	TI-84 (2.55MP)
To compute the mean and standard deviation (and more) on L_1, press [STAT] → [▶] → [ENTER] for "1-Var Stats".		
Press [2nd] → [1] to paste "L_1" onto the screen. For the 2.55MP version of the TI-84, make sure that the cursor is beside "List:" before pressing [2nd] → [1], then scroll down to "Calculate". Press [ENTER].		
Use the [▲] and [▼] arrow keys to scroll through all of the results.		

Two-Variable Statistics

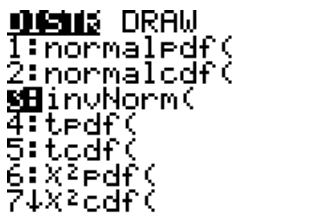
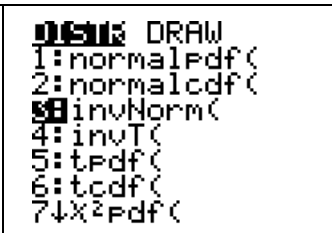
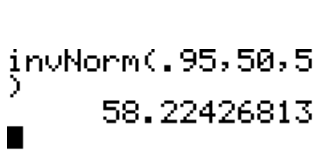
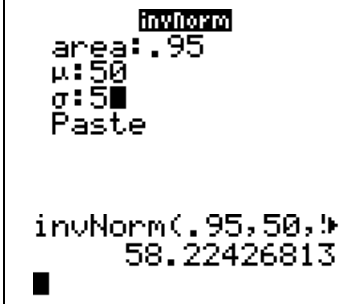
	TI-83, TI-84 (2.53MP AND LESS)	TI-84 (2.55MP)
To compute the mean and standard deviation (and more) on L_1 and L_2 simultaneously, press [STAT] → [▶] → [▼] → [ENTER] for "2-Var Stats".		
Press [2nd] → [1] → [,] → [2nd] → [2] to paste "L_1,L_2" onto the screen. The 2.55MP version of the TI-84 works slightly differently. Make sure that the cursor is beside "Xlist:", then press [2nd] → [1] to paste "L_1". Press [▼] then [2nd] → [2] to paste "L_2" beside "Ylist:", then scroll down to "Calculate". Press [ENTER].		
Use the [▲] and [▼] arrow keys to scroll through all of the results.		

Distributions – PROBABILITY DENSITY FUNCTION (PDF) AND CUMULATIVE DISTRIBUTION FUNCTION (CDF)

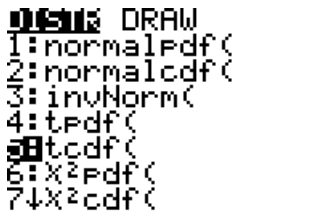
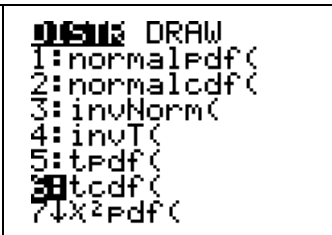
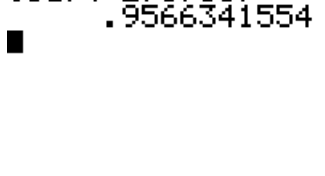
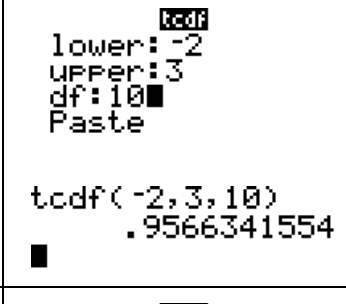
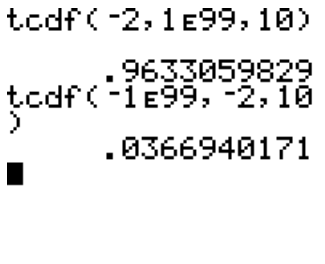
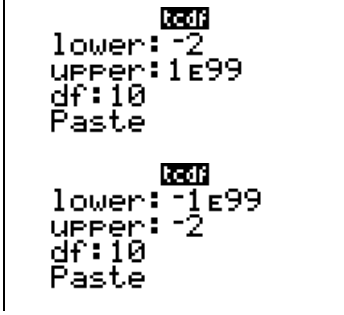
All of the functions used in the following examples are listed in the calculator's "Distributions" menu. To access this menu, press [2nd] → [VARS] for "DISTR".

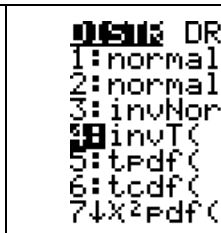
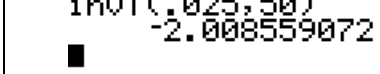
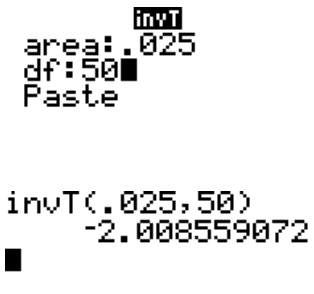
Normal CDF	**TI-83, TI-84 (2.53MP AND LESS)**	**TI-84 (2.55MP)**
In the Distributions menu, scroll down to "normalcdf(" and press [ENTER].		
The command syntax is "normalcdf(*lower value*, *upper value*, *mean*, *standard deviation*)". For example, if my lower value is 40, upper is 60, mean of 50 and standard deviation of 5, then "normalcdf(40,60,50,5)". Press [ENTER]. For the 2.55MP version of the TI-84, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice. **Note:** If you leave out the mean and standard deviation (or leave them as 0 and 1 in the 2.55MP version), the calculator assumes *z* values and not actual data values.		
To compute tail areas, you will need to enter positive infinity or negative infinity. For positive infinity type [1] → [EE] → 99, and for negative infinity type [(-)] → [1] → [EE] → 99.		

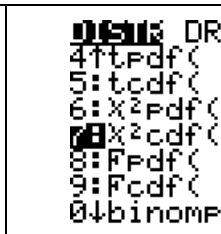
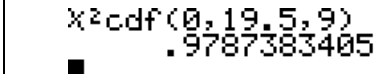
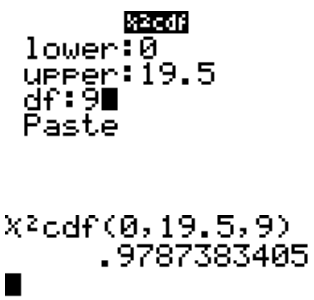
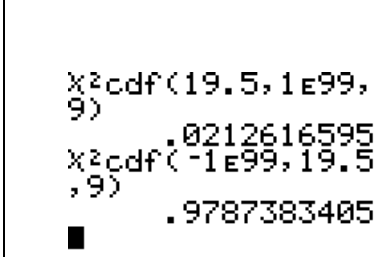
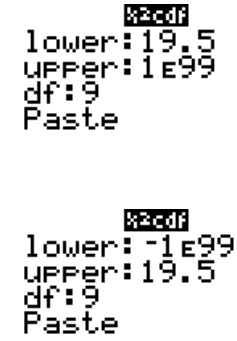
Inverse Normal

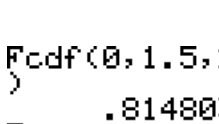
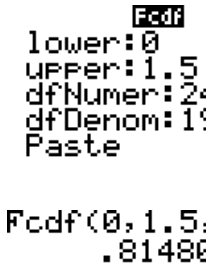
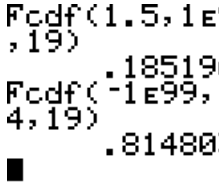
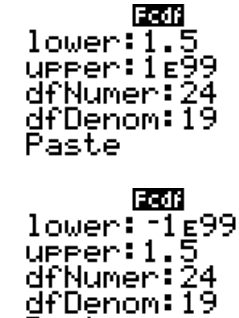
	TI-83, TI-84 (2.53MP AND LESS)	TI-84 (2.55MP)
In the Distributions menu, scroll down to "invNorm(" and press [ENTER].		
The command syntax is "invNorm(*area to the left of x*, *mean*, *standard deviation*)". Make sure the area that you enter is the area to the **left** of the *x* value you want to find. Press [ENTER]. For the 2.55MP version of the TI-84, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice. **Note:** If you leave out the mean and standard deviation (or leave them as 0 and 1 in the 2.55MP version), the calculator assumes *z* values and not actual data values.		

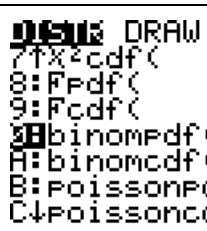
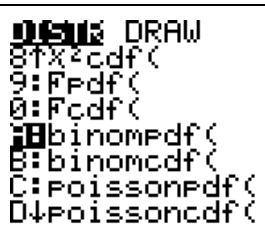
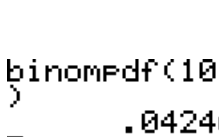
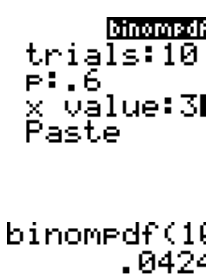
Student-t Distribution CDF

	TI-83, TI-84 (2.53MP AND LESS)	TI-84 (2.55MP)
In the Distributions menu, scroll down to "tcdf(" and press [ENTER].		
The command syntax is "tcdf(*lower t value*, *upper t value*, *degrees of freedom*)". For example, if my lower value is -2, upper is 3 and degrees of freedom is 10, then "tcdf(-2,3,10)". Press [ENTER]. For the 2.55MP TI-84 version, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice.		
To compute tail areas, you will need to enter positive infinity or negative infinity. For positive infinity type [1] → [EE] → 99, and for negative infinity type [(-)] → [1] → [EE] → 99.		

Inverse Student-t Distribution	**TI-84 (2.53MP AND LESS)**	**TI-84 (2.55MP)**
In the Distributions menu, scroll down to "invT(" and press [ENTER]. (This command only exists on the TI-84, not the TI-83.)		
The command syntax is "invT(*area to the left of t*, *degrees of freedom*)". Make sure the area that you enter is the area to the **left** of the *t* value you want to find. Press [ENTER]. For the 2.55MP version of the TI-84, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice.		

Chi-Square CDF	**TI-83, TI-84 (2.53MP AND LESS)**	**TI-84 (2.55MP)**
In the Distributions menu, scroll down to "χ^2cdf(" and press [ENTER].		
The command syntax is "χ^2cdf(*lower χ^2 value*, *upper χ^2 value*, *degrees of freedom*)". For example, if my lower value is 0, upper is 19.5 and degrees of freedom is 9, then "χ^2cdf (0,19.5,9)". Press [ENTER]. For the 2.55MP version of the TI-84, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice.		
To compute tail areas, you will need to enter positive infinity or negative infinity. For positive infinity type [1] → [EE] → 99, and for negative infinity type [(-)] → [1] → [EE] → 99.		

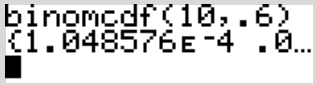
F Distribution CDF	**TI-83, TI-84 (2.53MP AND LESS)**	**TI-84 (2.55MP)**
In the Distributions menu, scroll down to "Fcdf(" and press [ENTER].		
The command syntax is "Fcdf(*lower F value*, *upper F value*, *numerator degrees of freedom*, *denominator degrees of freedom*)". For example, if my lower value is 0, upper is 1.5, numerator degrees of freedom is 24 and denominator is 19, then "Fcdf(0,1.5,24,19)". Press [ENTER]. For the 2.55MP version of the TI-84, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice.		
To compute tail areas, you will need to enter positive infinity or negative infinity. For positive infinity type [1] → [EE] → 99, and for negative infinity type [(-)] → [1] → [EE] → 99.		

Binomial PDF and CDF	**TI-83, TI-84 (2.53MP AND LESS)**	**TI-84 (2.55MP)**
In the Distributions menu, scroll down to "binompdf(" or "binomcdf(" and press [ENTER].		
The syntax for both of these functions is the same. Using the PDF as an example, "binompdf(*# of trials*, *probability of success*, *x value*)". For example, if my number of trials is 10, probability is .6 and *x* value is 3, then "binompdf(10,.6,3)". Press [ENTER]. For the TI-84 2.55MP version, fill in the entries on the screen, scroll down to "Paste" and press [ENTER] twice.		

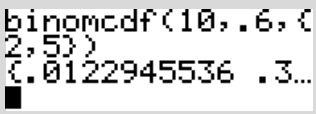
Let n be the number of trials, p be the probability of success, and k be the number of successes. We can compute these probabilities using the above two functions:

- $P(x = k) \rightarrow$ **binompdf(n, p, k)**
- $P(x \leq k) \rightarrow$ **binomcdf(n, p, k)**
- $P(x \geq k) \rightarrow$ **1 – binomcdf(n, p, k – 1)**
- $P(x < k) \rightarrow$ **binomcdf(n, p, k – 1)**
- $P(x > k) \rightarrow$ **1 – binomcdf(n, p, k)**

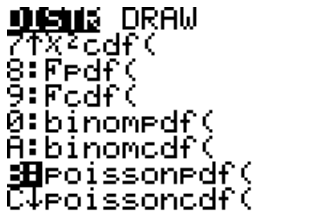
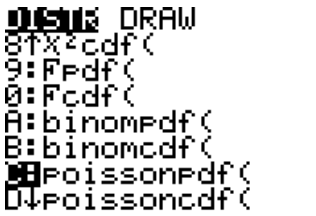
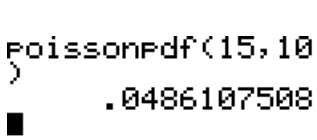
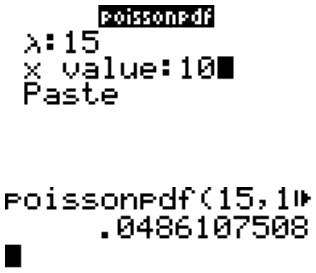
If you do not specify k, a list of probabilities from 0 to n is returned.



The k value can be a single number or a list of numbers.



Poisson PDF and CDF

	TI-83, TI-84 (2.53MP AND LESS)	TI-84 (2.55MP)
In the Distributions menu, scroll down to "poissonpdf(" or "poissoncdf(" and press ENTER.		
The syntax for both of these functions is the same. Using the PDF as an example, "poissonpdf(*mean value*, *x value*)". For example, if my mean value is 15 and x value is 10, then "poissonpdf(15,10)". Press ENTER. For the TI-84 2.55MP version, fill in the entries on the screen, scroll down to "Paste" and press ENTER twice.		

Let λ be the mean value and k be the number of occurrences. We can compute these probabilities using the above two functions:

- $P(x = k) \rightarrow$ **poissonpdf(λ, k)**
- $P(x \leq k) \rightarrow$ **poissoncdf(λ, k)**
- $P(x \geq k) \rightarrow$ **1 – poissoncdf(λ, k – 1)**
- $P(x < k) \rightarrow$ **poissoncdf(λ, k – 1)**
- $P(x > k) \rightarrow$ **1 – poissoncdf(λ, k)**

The k value can be a single number or a list of numbers.