TI 83

The instructions on this page also work for the TI-83 Plus and the TI-83 Plus Silver Edition.

The position of the graphically represented keys can be found by moving your mouse on top of the graphic.

Turn your calculator on

Press [ON].

Clearing the memory

Press [STAT]. The word EDIT should be highlighted (if not, arrow over to it). You should see five choices; the fourth is 4:ClrList. Press [4]. The screen will now say *ClrList*. Specify lists one and two, by pressing [2ND] [1] (you should see L1 above the key), then [,] [2ND] [2] (you should see L2 above the key). The screen will now say *ClrList L1, L2*. Press [ENTER]. Calculator will say *Done* signifying a clear memory.

Entering data

one variable

Press [STAT]. Press [1] (you should see *1:Edit* on the screen). You should see 3 columns: L1, L2, L3. The cursor should be at L1 (if not, arrow over to it). Type in the first number, then [ENTER]. Type in the second number, then [ENTER]. When finished, press [2ND] [MODE] (you should see the word QUIT above the key).

two variables

Press [STAT]. Press [1] (you should see 1:Edit on the screen). You should see 3 columns: L1, L2, L3. The cursor should be at L1 (if not, arrow over to it). Type in the first x-value, then [ENTER]. Repeat until all x-values are entered. Press [▶]. The cursor should jump to the top of the second column, L2. Enter the y-values (make sure they line up with the corresponding x values). When finished, press [2ND] [MODE] (you should see the word QUIT above the key).

Calculating one-variable statistics

mean (x)

Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the 1-Var stats option (that is, press [1]). You'll see the words 1-Var Stats on the screen. Press [2ND] [1] (you should see L1 above the key). You'll see the words 1-Var Stats L1 on the screen. Press [ENTER]. The mean is the top value on the screen.

standard deviation for populations (σ or σ_n)

Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the 1-Var stats option (that is, press [1]). You'll see the words 1-Var Stats on the screen. Press [2ND] [1] (you should see L1 above the key). You'll see the words 1-Var Stats L1 on the screen. Press [ENTER]. The population standard deviation is the fifth value on the screen.

standard deviation for samples (s or σ_{n-1})

Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the 1-Var stats option (that is, press [1]). You'll see the words 1-Var Stats on the screen. Press [2ND] [1] (you should see L1 above the key). You'll see the words 1-Var Stats L1 on the screen. Press [ENTER]. The sample standard deviation is the fourth value on the screen.

Calculating two-variable statistics

r (correlation)

The TI-83 will only display the correlation in the DiagnosticOn mode. If it's in this mode, go to the next paragraph. If it's not (and it probably isn't), press [2ND] [0] (you should see the word *CATALOG* above the key). You'll see a screen with an alphabetical list of commands. Arrow down to DiagnosticOn. Press [ENTER]. The screen will now say *DiagnosticOn.* Press [ENTER] again. You will see the word *Done*. You can continue now.
Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the LinReg(a+bx) option (that is, press [8]). You'll see the words *LinReg(a+bx)* on the screen. Press [2ND] [1] (you should see L1 above the key), then [,] [2ND] [2] (you should see L2 above the key). You'll see the words *LinReg(a+bx) L1,L2* on the screen. Press [ENTER]. The correlation is the fourth number in the list (r = ..). [NOTE: You can also find correlation by pressing 4: LinReg(ax+b), instead of 8: LinReg(a+bx). In this case, the roles of the a and b are switched, but r is the same.]

regression coefficients

slope

Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the LinReg(a+bx) option (that is, press [8]). You'll see the words *LinReg(a+bx)* on the screen. Press [2ND] [1] (you should see L1 above the key), then [,] [2ND] [2] (you should see L2 above the key). You'll see the words *LinReg(a+bx) L1,L2* on the screen. Press [ENTER]. The slope is the second number in the list. (b = ...). NOTE: You can also find correlation by pressing 4: LinReg(ax+b), instead of 8: LinReg(a+bx). In this case, the roles of the a and b are switched, but r is the same.]

y-intercept

Press [STAT]. Use the blue [▶] to move the highlighted bar over the CALC menu. Choose the LinReg(a+bx) option (that is, press [8]). You'll see the words *LinReg(a+bx)* on the screen. Press [2ND] [1] (you should see L1 above the key), then [,] [2ND] [2] (you should see L2 above the key). You'll see the words *LinReg(a+bx) L1,L2* on the screen. Press [ENTER]. The y-intercept is the first number in the list (a = ...). NOTE: You can also find correlation by pressing 4: LinReg(ax+b), instead of 8: LinReg(a+bx). In this case, the roles of the a and b are switched, but r is the same.]

Calculating combinations and permutations

combinations (nCr)

Enter the n value. Press [MATH]. You should see modes across the top of the screen. You want the fourth mode: PRB (arrow right three times). You will see several options: nCr is the third. Press [3]. Enter the r value. Press [ENTER].

permutations (nPr)

Enter the n value. Press [MATH]. You should see modes across the top of the screen. You want the fourth mode: PRB (arrow right three times). You will see several options: nPr is the second. Press [2]. Enter the r value. Press [ENTER].

Turning the calculator off

Press [2ND] [ON].

Worked Out Examples

In the following examples, we list the exact key sequence used to find the answer. We will list the keys by the main symbol on the key. In parentheses, we will list a helpful mnemonic, e.g. we will list e^x as SHIFT LN(e^x).

A: What is the mean and standard deviation of the following list of numbers? **15 16 20 21**

1: Clear Memory — STAT 4 2ND 1 (L1) , 2ND 2 (L2) ENTER

2: Enter Data — STAT 1 1 5 ENTER 1 6 ENTER 2 0 ENTER 2 1 ENTER 2ND MODE

3: Compute the mean — STAT ▶ (CALC) 1 (1-Var Stats) 2ND 1 (L1) ENTER

4: Compute the standard deviation (population) — STAT ▶ (CALC) 1 (1-Var Stats) 2ND 1 (L1) ENTER

5: Compute the standard deviation (sample) — STAT ▶ (CALC) 1 (1-Var Stats) 2ND 1 (L1) ENTER

You should get a mean of 18, population **St. Dev**. of 2.5495 and a sample **st. Dev**. of 2.9439.

B: Find the linear regression line for the following table of numbers. Also find the correlation.

x	1	2	3	4
y	2	4	5	7

1: Clear Memory — STAT 4 2ND 1 (L1) , 2ND 2 (L2) ENTER

2: Enter Data — STAT 1 (1:Edit) 1 ENTER 2 ENTER 3 ENTER 4 ENTER ▶ 2 ENTER 4 ENTER 5 ENTER 7 ENTER 2ND MODE (QUIT)

3: Compute the slope of the regression line — STAT ▶ (CALC) 8 (LinReg(a+bx)) 2ND 1 (L1) , 2ND 2 (L2) ENTER

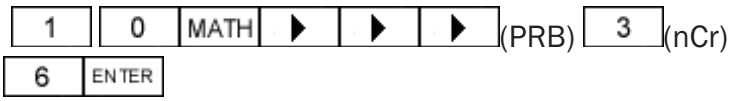
4: Compute the y-intercept of the regression line — STAT ▶ (CALC) 8 (LinReg(a+bx)) 2ND 1 (L1) , 2ND 2 (L2) ENTER

5: Compute the correlation — STAT ▶ (CALC) 8 (LinReg(a+bx)) 2ND 1 (L1) , 2ND 2 (L2) ENTER

You should get a slope of 1.6, a y-intercept of 0.5, and a correlation of 0.9923.
The regression line would be: $y = 1.6x+0.5$.

C: Find $_{10}C_6$ and $_9P_5$.

1: Compute $_{10}C_6$



2: Compute $_9P_5$

You should get $_{10}C_6 = 210$ and $_9P_5 = 15120$.

Go to:

Turn your calculator on

Press [ON].

Clearing the memory

Press [STAT]. The word EDIT should be highlighted (if not, arrow over to it). You should see five choices; the fourth is 4:ClrList. Press [4]. The screen will now say *ClrList*. Specify lists one and two, by pressing [2ND] [1] (you should see L1 above the key), then [,] [2ND] [2] (you should see L2 above the key). The screen will now say *ClrList L1, L2*. Press [ENTER]. Calculator will say *Done* signifying a clear memory.

Clearing the Graph Screen

Press [2ND] (You should see DRAW above the Key) [1] (You will now see ClrDraw on the screen.) [ENTER] (Calculator will say *Done* signifying a clear memory.)

It also helps to clear the function register. Press [Y=] [ENTER].

Entering data

one variable

Press [STAT]. Press [1] (you should see *1:Edit* on the screen). You should see 3 columns: L1, L2, L3. The cursor should be at L1 (if not, arrow over to it). Type in the first number, then [ENTER]. Type in the second number, then [ENTER]. Continue until finished.

two variables

Press [STAT]. Press [1] (you should see 1:Edit on the screen). You should see 3 columns: L1, L2, L3. The cursor should be at L1 (if not, arrow over to it). Type in the first x-value, then [ENTER]. Repeat until all x-values are entered. Press [▶]. The cursor should jump to the top of the second column, L2. Enter the y-values (make sure they line up with

the corresponding x values). Continue until finished.

Drawing the Graphs

Warning: Errors occur if the function register has functions in it. See above for instructions on how to clear the function register.

Scatterplot

Press [2ND] [Y=] (It says STAT PLOT above the key.) [ENTER]. The cursor is on ON. Press [ENTER] [▼]. The cursor is on the first of six graphs, the one that looks like this:  . This is the one we want, so press [ENTER]. Press [▼] [▼] [▼] to accept L1 as the first list and L2 as the second list. (If your data is in other lists, then input them here, press [2ND] followed by the key with your list number.). Use the [▶] to choose the mark you want. Press [Graph].

Histogram

Press [2ND] [Y=] (It says STAT PLOT above the key.) [ENTER]. The cursor is on ON. Press [ENTER] [▼]. Press [▶] [▶] to get the cursor on the graph that looks like this:  . This is the one we want, so press [ENTER]. If your data is in L1, then you can just press [Graph]. Otherwise, press [▼] and select your list (press [2ND] followed by the key with your list number).Now press [Graph].

Example graphs

Scatterplot

Problem: Make a scatterplot of the following data:

x:	7	2	4	2	5
y:	8	4	6	2	7

Solution:

1. Enter data: STAT ENTER ENTER

2	ENTER	4	ENTER	2	ENTER
	▶	8	ENTER	4	ENTER
6	ENTER	2	ENTER		ENTER

2. Clear the graph screen: 2ND Y=

4 ENTER

3. Draw the graph: 2ND Y= ENTER

ENTER ▼ (📈) ENTER ▼ ▼

▼ Graph

Histogram

Problem: Draw a histogram of the following data:

5 1 4 1 3 4 1 4 5 2

Solution:

1. Enter data: STAT ENTER ENTER

1	ENTER	4	ENTER	1	ENTER
3	ENTER	4	ENTER	1	ENTER
4	ENTER		ENTER	2	ENTER

2. Clear the graph screen: 2ND Y=

4 ENTER

3. Draw the graph: 2ND Y= ENTER

ENTER ▼ (📈) ENTER ▼ ▼

▼ Graph

Turning the calculator off

Press 2ND ON

TI-83
ADVANCED STATISTICS

Normal and T - Distribution

The position of the graphically represented keys can be found by moving your mouse on top of the graphic.

On this page, I will describe how to do the following functions:

Computing probabilities with normal distributions.
Inverse normal problems
A one-sample t-test
A one-sample z-test
A z-confidence interval
A t-confidence interval

Probabilities on the Normal Distribution

The Problem: Given a normal distribution X with mean μ and standard deviation σ, what is the probability that X is between a and b? P(a<X<b)

The Solution: Press [2ND][VARS](It should say DISTR above the key.) Press [2]. The screen will now say "*normalcdf(*". Enter a, b, μ, σ in that order with a [,] in between each. Press [)][ENTER].

If you want to compute P(X < b), then make a very small.
If you want to compute P(X > a), then make b very large.

Examples: A normal distribution X has a mean of 100 and a standard deviation of 8.

1. What is the probability that X is between 90 and 110?
2. What is the probability that X is larger than 120?

Solutions:

1. [2ND][VARS](DISTR) [2][9][0][,][1][1][0] [,][1][0][0][,][8][)][ENTER]. The answer should be .7887003221 or roughly 79%
2. [2ND][VARS](DISTR) [2][1][2][0][,][1][0] [0][0][,][1][0][0][,][8][)][ENTER]. The answer should be .0062096799 or roughly 0.62%

Inverse Probabilities on the Normal Distribution

The Problem: Given a normal distribution X with mean μ and standard deviation σ, what x-value is larger than a percentage p of the data? (p must be between 0 and 1, naturally.)
I.e., for what x is $P(X < x) = p$?

The Solution: Press [2ND] [VAR] (It should say DISTR above the key.) Press [3]. The screen will now say "*invnorm(*". Enter p, μ, σ in that order with a [,] in between each. Press [)] [ENTER].

If you want to compute $P(X > x) = p$. Compute $P(X < x) = 1 - p$.

Examples: A normal distribution has a mean of 20 and a standard deviation of 3.

1. Find x such that $P(X < x) = 70\%$
2. Find x such that $P(X > x) = 80\%$

Solutions:

1. [2ND] [VAR] (DISTR) [3] [.] [7] [0] [,] [2] [0] [,] [3] [)] [ENTER]. The answer should be 21.57320153
2. [2ND] [VAR] (DISTR) [3] [1] [(-)] [.] [8] [0] [,] [2] [0] [,] [3] [)] [ENTER]. The answer should be 17.4751363.

TI 83 / TI 84 Calculator Tips for Statistics

Descriptive Statistics

To find the mean, standard deviation, median, Q_1 & Q_3: first enter data into a list:
Stat – Edit – scroll up to top of list till L_1 is highlighted, press clear, scroll down, enter data, 2^{nd} Quit.
Then enter Stat, Calc, 1-Var Stats, 2^{nd} , L_1 or appropriate list #.
Example: given the following data: {1, 3, 7, 9}, determine the mean, standard deviation and variance.
enter "Stat", "Edit", scroll to top of list, "clear", scroll down, enter "1", "3", "7", "9" 2^{nd} , Quit, "Stat", "Calc", "1-Var Stats", 2^{nd} , L_1, enter.
Answer: mean = 5, std dev = 3.651483717, variance = 13.3333333334 (note: to get variance, square the standard deviation)

Counting Principles

Combination: ${}_nC_r$ (n objects taken r at a time; order doesn't matter.)
enter "n", Math, PRB, ${}_nC_r$, "r", "enter".
Permutation: ${}_nP_r$ (n objects taken r at a time; order does matter.)
enter "n", Math, PRB, ${}_nP_r$, "r", "enter".
Factorial: ! (n objects arranged in order)
enter Math, PRB, ! , "enter".
Examples: How many ways can 7 books be arranged on a bookshelf?
enter "7", Math, PRB, !, "enter".
Answer: 5040
A horse race has 12 entries. Assuming that there are not ties, in how many ways can these horses finish first, second, and third?
enter "12", Math, PRB, "3", "enter".
Answer: 1320

Binomial Probability

Binomial Rules:
1. 2 outcomes
2. Fixed # of trials
3. Probabilities are constant
4. Events are independent

p = probability of success
q = probability of failure
n = number of trials
To find P(x = #):
2^{nd} Vars – "binompdf" enter (n, p, x)
To find P(x < #):
2^{nd} Vars – "binomcdf" enter (n, p, x)
Examples: Find the probability of getting 7 heads in 10 flips of a coin.
2^{nd} Vars – "binompdf" (10, 0.5, 7)
Answer: 0.1171875
Find the probability of getting at least 7 heads in 10 flips of a coin. $P(x \geq 7) = 1 - P(x \leq 6)$
1 – 2^{nd} Vars – "binomcdf" (10, 0.5, 6)
Answer: 0.171875

Normal Probability

To find a probability if a Z-score is known:
2^{nd} Vars – "normalcdf" – enter "lower limit, upper limit"
Example: P(-0.9 < Z < 1.5)
Enter 2^{nd} Vars – "normalcdf" , (-0.9,1.5), enter.
Answer: 0.7491326798
If given x-scores, mean & std. dev:
2^{nd} Vars – "normalcdf" – "lower limit, upper limit, mean, std. dev." If x > #, use 999999 as upper limit. If X < #, use -999999 as lower limit.
Example: P(40 < x < 71), mean = 60, std dev = 18
2^{nd} Vars – "normalcdf" (40, 71, 60, 18) enter
Answer: 0.5961767383
To find z-scores when given cumulative probabilities:
2^{nd} Vars – "invnorm" – (enter probability as decimal)
Example: Find z-score for P_{80}.
2^{nd} Vars – "invnorm" (0.80) enter
Answer: 0.8416212335
To find an x-value given percent wanted, mean, std dev:
2^{nd} Vars – "invnorm" (% wanted, mean, std dev)
Example: Given mean = 500, std dev = 120, find Q_1.
2^{nd} Vars – "invnorm" ' (0.25, 500, 120)
Answer: 419

Confidence Intervals (1 – Sample)

If you have raw data, first enter data into a list:
Stat – Edit – scroll up to top of list till L_1 is highlighted, press clear, scroll down, enter data, 2^{nd} Quit.
z-interval: Stat – Tests – "z-interval" – choose Data if you have raw data or Stat of you have statistical data, press enter, enter rest of info requested, press calculate.
T-interval: Stat – Tests – "t-interval" – choose Data if you have raw data or Stat of you have statistical data, press enter, enter rest of info requested, press calculate.
1-PropZint: Stat – Tests – "1-PropZint" Enter information requested, press "calculate".
Example: Given n = 20, mean = 22.9, std dev = 1.5, find the 90% CI.
Stats – Tests – "Z-interval" – "Stats", enter statistics, press "calculate".
Answer: (22.348, 23.452)

Hypothesis Testing (1-Sample)

If you have raw data, first enter data into a list:
Stat – Edit – scroll up to top of list till L_1 is highlighted, press clear, scroll down, enter data, 2^{nd} Quit.
Z-Test: Stat – Tests – "Z-Test" choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of information requested, press "calculate".
T-Test: Stat – Tests – "T-Test" choose Data if you have raw data or Stat if you have statistical data, press enter, enter rest of information requested, press "calculate".
1-PropZtest: Stat – Tests – "a PropZtest" enter data requested, press "calculate".
Example: Use z-Test to test claim: $\mu < 5.500$, $\alpha = 0.01$, $\bar{X} = 5.497$. s = 0.011, n = 36
Answer: p = .05 > α , therefore, fail to reject H_o. There is not enough evidence at the 1% level to support the claim.

Hypothesis Testing 2 Samples

If you have raw data, first enter data into a list:
Stat – Edit – scroll up to top of list till L_1 is highlighted, press clear, scroll down, enter data, 2nd Quit.

2 SampZTest: Stat, Tests, 2-SampZTest, select Data if you have raw data, or Stats if you have statistical data, "enter", enter requested information, press "calculate".

2 SampTTest: Stat, Tests, 2-SampTTest, select Data if you have raw data, or Stats if you have statistical data, "enter", enter requested information, enter "yes" for Pooled if $\sigma_1^2 = \sigma_2^2$, otherwise enter "no", press "calculate".

2-PropZTest: Stat, Tests, 2-PropZTest, enter statistical data requested, press "Calculate".

Example 1: Claim:
$\mu_1 < \mu_2, \alpha = 0.01, \bar{X}_1, s_1, n_1,\ \bar{X}_2$=1195,$s_2$=105,$n_2$=105
Decide if you should reject or fail to reject the H_o.
"Stat", "Tests", "2-SampZTest", "Stats", "enter",
$\sigma_1 = 75, \sigma_2 = 105, \bar{X}_1 = 1225, n_1 = 35, \bar{X}_2 = 1195,$
$n_2 = 105, \mu_1 < \mu_2$, press "Calculate".
Answer: p = .967 > α, therefore, fail to reject H_o.

Example 2:
$H_o : \mu_1 \geq \mu_2, \alpha = 0.10, \bar{X}_1 = 0.515, s_1 = 0.305, n_1 = 11,$
$\bar{X}_2$=0.475,s_2=0.215,n_2=9, Assume $\sigma_1^2 = \sigma_2^2$. Decide if you should reject or fail to reject the H_o.
"Stat", "Tests", "2-SampTTest", "Stats", "enter",
$\bar{X}_1 = 0.515, s_1 = 0.305, n_1 = 11, \bar{X}_2 = 0.475, s_2 = 0.215,$
$n_2 = 9,\ \mu_1 > \mu_2$, Pooled: Yes, press "Calculate".
Answer: p = 0.37 > α, therefore fail to reject H_o.

Example 3: Claim: $p_1 \leq p_2$, α = 0.10,
$x_1 = 344, n_1 = 860, x_2 = 304, n_2 = 800.$ Decide if you should reject or fail to reject the H_0.
"Stat", "Tests", "2-PropZTest",
$x_1 = 344, n_1 = 860, x_2 = 304, n_2 = 800, p_1 < p_2,$
press "calculate".
Answer: p = 0.20 > α, therefore fail to reject the H_0.

Linear Regression & Correlation

Before calculating r, you must enter the Diagnostic On command.
2nd , 0 (catalog), "Diagnostic On", enter, enter.
First enter raw data into a list:
Stat – Edit – scroll up to top of list till L_1 is highlighted, press clear, scroll down, enter data, 2nd Quit.
"Stat", "CALC", "LinReg (ax + b)", 2nd , L_1 or appropriate list # for x, 2nd , L_2 or appropriate list # for y, enter. Output should look something like the following:

LinReg

y = ax + b	where
a = 11.8244078	a = slope
b = 35.30117105	b = y-intercept
r^2 = .9404868083	r^2 = coefficient of determination
r = .9697869912	r = correlation coefficient