Save This Sheet !

TI-84+ Quick Reference Sheet AP Statistics

Calculator ID #:
Choose 2nd MEM, #1 About
ID****-****-****

Been Playing Games?
Run DEFAULTS to reset calculator. 2nd MEM, #7 Reset, #2 Defaults, #2 Reset

To Plot Histograms and Box-Whisker Plots:

1. Place data in Lists: STAT → EDIT
2. Set up plot information: STAT PLOT #1 <ENTER>
   Highlight ON, choose symbol for histogram, XList: L_1
   OR choose symbol for box-whisker, Freq: 1
3. Graph: ZOOM #9 - TRACE to see values on graph
4. Xscl under WINDOW controls width of bars on histogram. An integer value is easiest to read.

To Get Statistical Information:

1. Place data in Lists: STAT → EDIT
2. Engage 1-Variable Statistics: STAT → CALC #1 1-VAR STATS
3. On Home Screen indicate list containing the data: 1-VAR STATS L_1

$\bar{x}$ = mean
Sx = the sample standard deviation
σ_x = the population standard deviation
n = the sample size (# of pieces of data)
Q_1 = data at the first quartile
med = data at the median (second quartile)
Q_3 = data at the third quartile

Diagnostics ON: must be ON to see correlation coefficient, *r*.
1. MODE – StatDiagnostics: ON
or 2. CATALOG, ALPHA D, DiagnosticOn, ENTER, ENTER

To Get Scatter Plots and Regressions

(Linear, Quadratic, Exponential, Power, etc)

1. Place data in Lists: STAT → EDIT
2. Graph scatter plot: STAT PLOT #1 <ENTER> Choose ON. Choose the symbol for scatter plot, choose L_1 , L_2, choose mark
3. To graph, choose: ZOOM #9
4. To get regression equation: STAT → CALC #4 Lin Reg($ax+b$) (or whichever regression is needed)
5. On Home Screen: LinReg($ax+b$) L_1 , L_2 , Y_1
6. to see graph – GRAPH

To get Y_1 to appear:
VARS → Y-VARS
Choose FUNCTION, Y_1
OR ALPHA F4

To Get Residuals: After preparing a regression equation (using L_1 and L_2), residuals are stored in a list called RESID. To plot residuals:

1. Go to top of L_3, press ENTER.
2. Go to LIST (2nd STAT) – choose #7 RESID, press ENTER.
3. Go to STAT PLOT, Plot 1, ON
4. Type: first icon (scatter plot)
5. XList: L_1 YList: L_3
6. ZOOM 9:ZoomStat

Normal Distributions DISTR(2nd VARS)

1. **normalcdf** (lower, upper, mean, s.d.) *Finds prob. on cumulative interval.*
   • to enter ∞, use 10^99 or 1 EE 99.
2. **normalpdf**(*x*, mean, s.d.) *Graphs the normal distribution.*
   • Window: Xmin = mean – 3 s.d.; Xmax = mean + 3 s.d.; Xscl = s.d.
   Ymin = 0; Ymax = 1/(2 s.d.); Yscl = 0
3. **ShadeNorm**(lower, upper, mean, s.d.) *To see area and % under curve.*
   • must graph using normalpdf first, or you won't see your shading.
4. **invnorm**(percentage, mean, s.d.)
   • use when you know percentile and want to find the associated score.

Student-t Distributions DISTR(2nd VARS)

1. **tpdf** (x, df) *Probability density func. (graph only)*
   • enter into *Y*=, x = variable, *df* (degrees freedom) > 0
2. **tcdf (**lower, upper, df) *Distribution probability*
   • between lowerbound & upperbound, df > 0
3. **invT**(left tail area, df)
   • not available on TI-83 models

(These commands are rarely, if ever, used at this level.)

Math Formula:
$(1-p)^{r-1} \cdot p$
p = prob. success
$r = r^{th}$ trial

Binomial Distributions DISTR(2nd VARS)

1. **binompdf** (#trials (n), prob. of success (p), # successes desired (r))
   • used for a specific number of desired successes (> 0).
   • if desired # not given, returns list of prob. 0 to # trials
2. **binomcdf**(# trials, prob. of success, # successes desired)
   • finds prob. of up to # of successes desired)
   • if desired # not given, returns list of cumulative probs.

Geometric Distributions DISTR(2nd VARS)

1. **geometpdf** (prob. of success, specific trial #)
   • finds prob. of a success on the specified trial #
2. **geometcdf** (prob. of success, specific trial #)
   • find prob. of success on, or before, specified trial #

In both cases, the specified trial number can be a real number or a list of real numbers.
These can be tricky, so keep math formula handy.

Generating Random Numbers

Calculators and computers use a formula to generate "random numbers" which are called "pseudo-random".

1. Generate Random Integers (1 at a time):
   MATH → PRB #5 randInt(
   randInt (starting value, ending value)
2. Generate Random Integers (several at a time):
   randInt(starting value, ending value, # to be shown)
3. Generate Random Integers in a List
   randInt(0,10,100) → L_1
   puts 100 integers between 0 and 100 inclusive in List 1
4. To prevent random numbers from repeating, choose:
   randIntNoRep(
5. Generate rand numbers (not integers)
   rand (generates random numbers between 0 and 1)
   rand*12 (generates random numbers between 0 and 12)
   rand(10)*12→L₁ (generates 10 random numbers between 0 and 12 and stores them in List 1)
6. Re-Seeding the Generator: To prevent the random list from always starting from the same number, you need to re-seed the rand command, such as **5 → rand** (and then continue as you wish)
7. Generate random numbers from Normal Distribution model
   randNorm(mean, s.d.,) one at a time (not integers)
   randNorm(mean, s.d., # to be shown) shows several at a time

Stat vs Data: • given actual data choose **Data** • given summary statistics (mean, s.d.), choose **Stats.**

Inferential Testing STAT (TESTS)

1. **Z-Test(**
   • tests for one unknown pop. mean when pop. s.d. is known.
   • *Use:* (1) pop. s.d. is known, (2) sample mean is known, (3) don't know pop. mean, (4) to test sample mean with some value
2. **T-Test(**
   • test for one unknown pop. mean when pop. s.d. unknown
   • *Use:* (1) sample mean is known, (2) don't know pop. mean, (3) to test sample mean with some value
3. **2-SampleZTest(**
   • test comparing 2 means when both pop. s.d. are known.
   • it is unusual to know BOTH pop. s.d.
   • Draw shows z-score and p-value
4. **2-SampleTTest(**
   • test comparing 2 means when both pop. s.d. are unknown.
   • *Use:* (1) Both sample means and s.d. are known, (2) don't know pop. means, (3) to test sample mean with some value
5. **1-PropZTest** (null hypothesis, # of successes (x), sample size (n), type of alt. hypothesis, display option)
   • computes a test for one proportion of successes
   • calculates z-score, p-value and proportion for sample pop.
   • if given p-hat instead of # of successes, x, calculate x by multiplying p-hat by n and rounding to nearest integer.
6. **2-PropZTest** (# of successes both, both counts)
   • Test comparing 2 proportions of successes.
   • *Use*: (1) working with 2 populations with different values of n where both proportions of success are known, (2) to test if there is a statistical difference.
7. **Chi-Square Test** (assesses goodness of fit between observed values and those expected)
   • requires observed and expected data in matrix form
   • X^2-Test (matrix observed data, matrix expected data, display)
8. **Chi-Square GOF Test** *(goodness of fit)*
   • X^2GOF-Test [works with lists]
   • use for simple random sampling, 1 categorical variable, and expected frequency of at least 5.

LinRegTTest STAT (TESTS)
• computes linear regression on data, and a t test on the value of slope and correlation coefficient
• residuals are created and stored in RESID
• use to test the degree of strength of the relationship

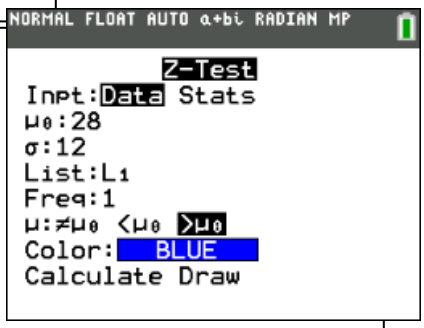
LinRegTInt
Confidence interval for linear regression slope coefficient b
• computes linear regression T confidence interval for the slope coefficient b. If the confidence interval contains 0, this is insufficient evidence that the data exhibits a linear relationship.

Chi-Square Distribution DISTR(2nd VARS)

• ***X*** **^{2}pdf** (x,df) [yields probability density function value – plots chi^2 curve with x as the variable]
The mean of a chi-square distribution equals the number of degrees of freedom of the distribution.

• ***X*** **^{2}cdf** (lower bound, upper bound, df)
computes the X^2-distribution probability on interval
[finds area under a chi-square distribution given the degrees of freedom] P(lower bound < X^2 < upper bound)

Using Test Editors:



1. Select *Data* or *Stats* input
• select *Data* to enter data lists
• select *Stats* to enter statistics such as mean, s.d., number
2. Enter values for arguments
• u_0 = hypothesized value of population mean being tested
• σ = known pop. s.d. (> 0)
• List = name of list containing data
• Freq = name of list containing frequency, defaults to 1
3. Select *alternative hypothesis*
• select first option for Z-test
• select second for 2-SampTTest
• select third for 2-PropZTest
4. Select *Calculate* or *Draw* output/display option
• *Calculate* shows test calculations on the home screen
Will be only choice for a Confidence Level
• *Draw* shows a graph (automatic window adjustment)

Confidence Intervals (CI) STAT (TESTS)

Calculates confidence interval for an unknown proportion of successes.

1. **ZInterval(**
   • computes CI for unknown pop. mean with known.s.d
   • assume population distribution is normal
   • be sure to highlight Calculate before hitting Enter
2. **TInterval(**
   • computes CI for unknown pop. mean with unknown s.d
   • use when sample mean and s.d. are known
   • assume population distribution is normal
3. **2-SampZInt(**
   • computes CI for difference between 2 pop. means when both s.d. are known (which is quite unusual).
   • depends upon user-specified confidence level
4. **2-SampTInt(**
   • computes CI for difference between 2 pop. means when both s.d. are unknown.
   • use when both sample means and s.d. are known
   • assume samples are normally distributed
   • depends upon user-specified confidence level
5. **1-PropZInt(**
   • computes CI for unknown proportion of successes
   • use when sample size and # of successes are known
   • depends upon user-specified confidence level
6. **2-PropZInt(**
   • computes CI for difference between proportion of successes in 2 populations.
   • use when 2 samples have different # of successes
   • depends upon user-specified confidence level

ANOVA STAT (TESTS)

One-way analysis of variance.
ANOVA(L1, L2, L3, L4)
• computes a one-way analysis of variance for comparing the means of two to 20 populations (compares means).
• determines an F ratio to show if the means are significantly different from one list to another
• SS = sum of squares • MS = mean squares