

*Advanced Placement*

# **Statistics in Action**

**Understanding a World of Data**

**Second Edition**

**Calculator Notes for the Texas Instruments  
TI-83 Plus and TI-84 Plus**

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**Key Curriculum Press**  
Innovators in Mathematics Education

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<b>Text Designer</b>	Anthology, Inc.
<b>Composer</b>	ICC Macmillan Inc.
<b>Art Editor</b>	LMP Media
<b>Cover Designers</b>	Jensen Barnes, Nidaul Uk
<b>Cover Photo Credit</b>	Getty Images/Alberto Incrocci
<b>Printer</b>	Von Hoffmann Corporation
<b>Textbook Product Manager</b>	James Ryan
<b>Executive Editor</b>	Casey FitzSimons
<b>Publisher</b>	Steven Rasmussen

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Key Curriculum Press  
1150 65th Street  
Emeryville, CA 94608  
510-595-7000  
editorial@keypress.com  
www.keypress.com

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1            11 10 09 08 07

ISBN: 978-1-55953-913-5

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# Introduction

These Calculator Notes are written to help you effectively use the Texas Instruments TI-83 Plus and TI-84 Plus graphing calculators to support *Statistics in Action: Understanding a World of Data*. By introducing specific functions, keystrokes, and programs, these notes will help you gain expertise using the calculators to perform the statistical functions needed for an introductory statistics course—either Advanced Placement Statistics or another high school statistics course. How much you need these notes will depend on your experience with graphing calculators and whether you make the graphing calculator the primary technology tool for statistical calculations. All functions needed to perform on the AP Statistics Exam are covered in this book.

The first chapter gives a basic overview of the calculators' operation—keystrokes, menus, programming, and so on. This chapter does not correspond to a particular chapter in *Statistics in Action*. Rather, it is intended to be a first-time introduction or a refresher, especially if you or your students do not have a lot of experience with graphing calculators. As needed, later calculator notes will refer back to this section.

The remaining chapters in this book contain the Calculator Notes referred to in the student book. Calculator functions are introduced when they are first applicable, frequently using an example from the student book. It is up to the instructor or students to determine the best way to use calculators subsequently during the exercises. (*Note:* Occasionally the *Statistics in Action Instructor's Guide* gives suggestions for using graphing calculators with specific exercises.)

How you share calculator instructions will depend on your students' needs, your access to a copy machine, and your duplicating budget. You may study these notes yourself and share calculator instructions with your students via lecture, or you may photocopy and distribute pages to your students. If your students have had limited experience with graphing calculators, an ideal strategy is to distribute the instructions to each student—either page by page or for an entire chapter—before you begin work on that chapter. Another strategy is to make several classroom sets that students refer to during class or borrow overnight. Alternatively, you or your students can access these Calculator Notes electronically by downloading chapters from the *Statistics in Action Instructor Resource Center* website, found at [www.keypress.com](http://www.keypress.com), or the student resource website, [www.keymath.com](http://www.keymath.com).

Even if you don't usually copy a complete set of calculator instructions, you may find it helpful to distribute copies of particular sections to all of your students. For example, several sections in this book contain special calculator programs. If students manually input these programs rather than download them, they will need access to a hard copy of the program. If you have TI Connect™ linking software and access to a computer, you can take advantage of the programs and data found on the *Statistics in Action Instructor's Resource CD* and also available at [www.keypress.com/SIA](http://www.keypress.com/SIA). You can download programs or data from the CD to

a computer and then to a calculator linked to the computer. Students can link their calculators to each other to transfer the data and programs. By downloading programs and data in this way, you and your students can avoid the hassle of debugging programs and checking the accuracy of data input.

This book includes only those functions of the TI-83 Plus and TI-84 Plus that are related to *Statistics in Action*, specifically, or to the study of statistics, in general. If you should need other calculator functions, consult the *TI-83 Plus Graphing Calculator Guidebook* or the *TI-84 Plus Graphing Calculator Guidebook*.

## **The Command Summary Sheet**

The Command Summary Sheet on pages ix–x is a quick reference of 44 useful statistics commands. It gives a verbal description of the function, the command syntax, and the keystrokes to access the command. The Command Summary Sheet also acts as an index, referencing page numbers in this book where you can find more information about the command. You will probably want to distribute a copy of the Command Summary Sheet to each student.

## **The TI-83 Plus and TI-84 Plus Calculators and the AP Exam**

Students are expected to bring a graphing calculator with statistical capabilities, such as the TI-83 Plus or TI-84 Plus, to the AP Statistics Exam. Calculators with a QWERTY (i.e., typewriter arrangement) keyboard currently are not allowed.

For current information about the policy regarding calculators on AP Exams, please visit the College Board's website, [www.collegeboard.com](http://www.collegeboard.com), or their AP Central website, [apcentral.collegeboard.com](http://apcentral.collegeboard.com).



# Command Summary Sheet

These two pages contain a summary of 44 useful statistics commands for the TI-83 Plus and TI-84 Plus. This summary provides a description of each command, the required parameters and any optional parameters (in square brackets), and the keystrokes necessary to access the command. This table also contains an index of page numbers where you can find more information about the commands in *Statistics in Action Calculator Notes for the Texas Instruments TI-83 Plus and TI-84 Plus*.

Description of Command	Command Syntax	Keystrokes	Page No.
binomial cumulative probability	$\text{binomcdf}(\text{number of trials}, \text{probability}[, \text{successes}])$	$\boxed{2\text{ND}}$ [DISTR] A:binomcdf(	42
binomial probability	$\text{binompdf}(\text{number of trials}, \text{probability}[, \text{successes}])$	$\boxed{2\text{ND}}$ [DISTR] 0:binompdf(	41–42
chi-square cumulative distribution function (area under the curve)	$\chi^2\text{cdf}(\text{lower bound}, \text{upper bound}, \text{degrees of freedom})$	$\boxed{2\text{ND}}$ [DISTR] DISTR 7: $\chi^2\text{cdf}(\text{$	65–66
chi-square probability density function (also used in the Y= menu for graphing)	$\chi^2\text{pdf}(x, \text{degrees of freedom})$	$\boxed{2\text{ND}}$ [DISTR] DISTR 8: $\chi^2\text{pdf}(\text{$	65
chi-square test of homogeneity or independence ( <i>not</i> goodness-of-fit)	$\chi^2$ -Test	$\boxed{\text{STAT}}$ TESTS C: $\chi^2$ -Test(	66–67
combinations	$n \text{ nCr } r$	$\boxed{\text{MATH}}$ PRB 3:nCr	18
confidence interval for a mean, $\sigma$ known	ZInterval	$\boxed{\text{STAT}}$ TESTS 7:Zinterval	56–57
confidence interval for a mean, $\sigma$ unknown	TInterval	$\boxed{\text{STAT}}$ TESTS 8:TInterval	56
confidence interval for a proportion	1-PropZInt	$\boxed{\text{STAT}}$ TESTS A:1-PropZInt	50
confidence interval for the difference of two means, $\sigma_1$ and $\sigma_2$ known	2-SampZInt	$\boxed{\text{STAT}}$ TESTS 9:2-SampZInt	51, 59–60
confidence interval for the difference of two means, $\sigma_1$ and $\sigma_2$ unknown	2-SampTInt	$\boxed{\text{STAT}}$ TESTS 0:2-SampTInt	59
confidence interval for the difference of two proportions	2-PropZInt	$\boxed{\text{STAT}}$ TESTS B:2-PropZInt	51
cumulative summation of the numbers in a list	$\text{cumSum}(\text{list})$	$\boxed{2\text{ND}}$ [LIST] OPS 6:cumSum(	24–25, 38
dimension of a list (used for sample size)	$\text{dim}(\text{list})$	$\boxed{2\text{ND}}$ [LIST] OPS 3:dim(	21, 22, 36
geometric cumulative probability	$\text{geometcdf}(\text{probability}, \text{trial of first success})$	$\boxed{2\text{ND}}$ [DISTR] DISTR E:geometcdf(	44
geometric probability	$\text{geometpdf}(\text{probability}, \text{trial of first success})$	$\boxed{2\text{ND}}$ [DISTR] DISTR D:geometpdf(	43, 44
least squares regression line	$\text{LinReg}(ax+b)$ [ $x$ list, $y$ list, frequency list, function]	$\boxed{\text{STAT}}$ CALC 4:LinReg(a+bx)	31–32
	$\text{LinReg}(a+bx)$ [ $x$ list, $y$ list, frequency list, function]	$\boxed{\text{STAT}}$ CALC 8:LinReg(a+bx)	
list generated by a sequence	$\text{seq}(\text{formula}, \text{variable}, \text{start}, \text{end}[, \text{increment}])$	$\boxed{2\text{ND}}$ [LIST] OPS 5:seq(	37

Description of Command	Command Syntax	Keystrokes	Page No.
normal cumulative distribution function (area under the curve)	<code>normalcdf(lower bound, upper bound[,mean, standard deviation])</code>	$\boxed{2ND}$ [DISTR] DISTR 2:normalcdf(	26
normal distribution, draw and shade	<code>ShadeNorm(lower bound, upper bound[,mean, standard deviation])</code>	$\boxed{2ND}$ [DISTR] DRAW 1:ShadeNorm(	12, 26, 27
normal distribution's $x$ -value or $z$ -score corresponding to a known area	<code>invNorm(area[,mean, standard deviation])</code>	$\boxed{2ND}$ [DISTR] DISTR 3:invNorm(	27, 49–50
normal probability density function (also used in the $Y=$ menu for graphing)	<code>normalpdf(x[,mean, standard deviation])</code>	$\boxed{2ND}$ [DISTR] DISTR 1:normalpdf(	19–20
random integer	<code>randInt(lower bound,upper bound[,number])</code>	$\boxed{MATH}$ PRB 5:randInt(	19, 35, 37, 64
random number between 0 and 1	<code>rand[(number of trials)]</code>	$\boxed{MATH}$ PRB 1:rand	19, 35
random number from a binomial distribution	<code>randBin(number of trials, probability[,number of simulations])</code>	$\boxed{MATH}$ PRB 7:randBin(	35, 38, 46, 49
random number from a normal distribution	<code>randNorm(mean, standard deviation[,number of trials])</code>	$\boxed{MATH}$ PRB 6:randNorm(	35, 45, 68
significance test for a mean, $\sigma$ known	Z-Test	$\boxed{STAT}$ TESTS 1:Z-Test	58–59
significance test for a mean, $\sigma$ unknown	T-Test	$\boxed{STAT}$ TESTS 2:T-Test	58–59
significance test for a proportion	1-PropZTest	$\boxed{STAT}$ TESTS 5:1-PropZTest	50–51
significance test for a slope	LinRegTTest	$\boxed{STAT}$ TESTS E:LinRegTTest	69
significance test for the difference of two means, $\sigma_1$ and $\sigma_2$ known	2-SampZTest	$\boxed{STAT}$ TESTS 3:2-SampTTest	60
significance test for the difference of two means, $\sigma_1$ and $\sigma_2$ unknown	2-SampTTest	$\boxed{STAT}$ TESTS 4:2-SampTTest	60
significance test for the difference of two proportions	2-PropZTest	$\boxed{STAT}$ TESTS 6:2-PropZTest	51
sum of the numbers in a list	<code>sum(list)</code>	$\boxed{2ND}$ [LIST] MATH 5:sum(	22, 25, 30, 32, 37, 40
summary statistics of a list or frequency table	1-Var Stats <i>list</i> [,frequency list]	$\boxed{STAT}$ CALC 1:1-Var Stats	23–24, 41
<b>The minimum, maximum, mean, median, standard deviation, and variance can also be individually calculated.</b>			
	<code>min(list)</code>	$\boxed{2ND}$ [LIST] MATH 1:min(	
	<code>max(list)</code>	$\boxed{2ND}$ [LIST] MATH 2:max(	
	<code>mean(list[,frequency list])</code>	$\boxed{2ND}$ [LIST] MATH 3:mean(	22
	<code>median(list[,frequency list])</code>	$\boxed{2ND}$ [LIST] MATH 4:median(	
	<code>stdDev(list[,frequency list])</code>	$\boxed{2ND}$ [LIST] MATH 7:stdDev(	
	<code>Variance(list[,frequency list])</code>	$\boxed{2ND}$ [LIST] MATH 8:variance	
summary statistics of two lists or frequency tables	2-Var Stats $x$ list, $y$ list [,frequency list]	$\boxed{STAT}$ CALC 2:2-Var Stats	32–33
$t$ cumulative distribution function (area under the curve)	<code>tcdf(lower bound, upper bound, degrees of freedom)</code>	$\boxed{2ND}$ [DISTR] DISTR5:tcdf(	55–56, 58
$t$ probability density function (also used in the $Y=$ menu for graphing)	<code>tpdf(x, degrees of freedom)</code>	$\boxed{2ND}$ [DISTR] DISTR 4:tpdf(	57–58