

Heavy Hitting

An Exploration of Weighted Means with the TI-89

Teacher Notes

An activity in support of the NCTM Data Analysis and Probability Standard: To select and use appropriate statistical methods to analyze data, with expectation: for univariate measurement data...select and calculate summary statistics.

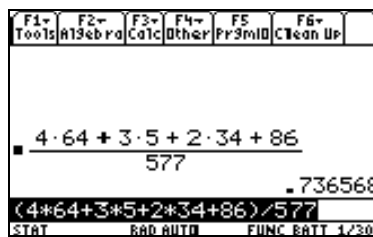
Statistics Scope and Sequence Topic: Univariate Data, Measures of Center.

This exploration uses baseball's slugging average, to compute weighted means. Some students may need an explanation of the terms singles, doubles, triples, and home runs.

Sometimes the number of singles are not given in statistical reports. In this case singles can be computed by taking total hits minus the sum of home runs, triples, and doubles.

The mean and the 1-Var Stats commands are often used with a single list as the parameter. In this technique the second list named as parameter is interpreted as a list of frequencies and the weighted mean is computed directly.

Solutions to Exercise 1:



TI-89 calculator screen showing a weighted mean calculation:

$$\frac{4 \cdot 64 + 3 \cdot 5 + 2 \cdot 34 + 86}{577} = .736568$$

The screen also shows the command $(4*64+3*5+2*34+86)/577$ and the status bar: STAT RAD AUTO FUNC BATT 1/30.

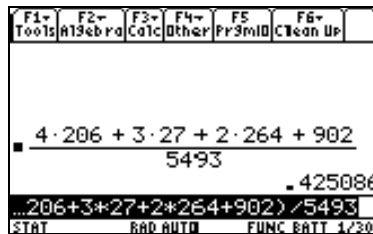


TI-89 calculator screen showing the mean(list1, list2) command:

$$\text{mean}(\text{list1}, \text{list2}) = .736568$$

The screen also shows the command $\text{mean}(\text{list1}, \text{list2})$ and the status bar: STAT RAD AUTO FUNC BATT 1/30.

Solutions to Exercise 2:



TI-89 calculator screen showing a weighted mean calculation:

$$\frac{4 \cdot 206 + 3 \cdot 27 + 2 \cdot 264 + 902}{5493} = .425086$$

The screen also shows the command $(4*206+3*27+2*264+902)/5493$ and the status bar: STAT RAD AUTO FUNC BATT 1/30.



TI-89 calculator screen showing the mean(list1, list2) command:

$$\text{mean}(\text{list1}, \text{list2}) = .425086$$

The screen also shows the command $\text{mean}(\text{list1}, \text{list2})$ and the status bar: STAT RAD AUTO FUNC BATT 1/30.

Heavy Hitting

An Exploration of Weighted Means with the TI-89

Many examples of statistics are found in the world of sports. In the game of baseball, one measure of performance is called the slugging average. Slugging average is defined as the number of total bases divided by the number of at-bats. If a player reaches first base safely, a single, the player would be credited with one base. A two base hit, a double is worth two total bases, a triple is worth three and a home run is worth four. An at-bat is each attempt for a hit. In actual baseball statistics, certain outcomes such as walks and sacrifice bunts don't count as at-bats, but we will not be concerned with those.

Example:

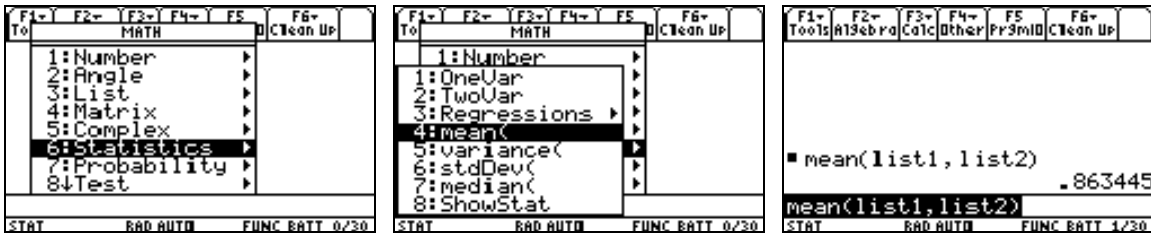
Suppose Bobby Basher had 73 home runs, 2 triples, 32 doubles, and 49 singles in 476 at-bats. We can compute his total bases. Then divide to compute his slugging average:

F1→	F2→	F3→	F4→	F5	F6→
Tools	Plots	List	Calc	Distr	Tests
4 · 73 + 3 · 2 + 2 · 32 + 49 411					
■ 411					
■ 476 .863445					
ans(1) / 476					
STAT RAD AUTO FUNC BATT 2/30					

The data for Bobby can also be entered into lists. If the number of bases for each type of hit is entered into list1 and the number of each that Bobby hit is entered into list2, we can interpret list2 as the set of *frequencies*. However, this method requires us to enter the number of times Bobby did not get a hit, the at-bats minus the sum of the four hit numbers, and use that value as the frequency for zero bases:

F1→	F2→	F3→	F4→	F5	F6→	F7→
Tools	Plots	List	Calc	Distr	Tests	Ints
list1	list2	list3	list4			
4	73	-----	-----			
3	2	-----	-----			
2	32	-----	-----			
1	49	-----	-----			
0	320	-----	-----			
-----	-----	-----	-----			
list2[6]=						
STAT RAD AUTO FUNC BATT 2/6						

His slugging average, or weighted mean, can be computed by the mean command. Use 2nd [MATH] 6 4 , enter the list names, $\text{)} \blacklozenge$ [ENTER]. The diamond key will return a decimal rather than a fraction.



Exercise 1: Use both methods to compute the slugging average for Sonny Slugger, if he had 64 home runs, 5 triples, 34 doubles, and 86 singles in 577 at-bats. Write the commands and the results:

Exercise 2: Use both methods to compute the slugging average for the Lions team. The Lions had 206 home runs, 27 triples, 264 doubles, and 902 singles in 5493 at-bats. Write the commands and the results: