

Round Off Rules for This Course

The Round Off Rule for the Mean and Standard Deviation

Round off **the mean and standard deviation** you find using your calculator to **2 decimal places**.

Use this 2 decimal place number in any calculations that involve the mean and standard deviation

Table Values

Values read from a table are not rounded off. Use the exact value listed in the table

The Round Off Rule for numbers substituted into a Formula

1. State the Formula with the variables as given in the notes.
2. Substitute the numbers **given in the problem** exactly as they are given.
3. Substitute numbers **read from a table** exactly as they are given.
4. Substitute numbers calculated before the use of the formula to 2 decimal places.

Place all numbers into the calculator and calculate the answer with one calculation.
Do not perform intermediate calculations.

The Round Off Rule for the final answers in this class

Round off the **final answer in a problem to 2 decimal places** unless instructed differently by your instructor.

Notation

x is the variable that represents the individual data values for a set of data.

$\sum x$ denotes the sum of **all the values of x** for a given data set .

Sample Data

Sample Size

n is the size of the sample

Sample Mean

\bar{x} (read x bar) is the sample mean

$$\bar{x} = \frac{\sum x}{n}$$

Sample Standard Deviation

s_x (read s sub x) is the sample standard deviation

$$s_x = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Population Data

Population Size

N is the size of the population

Population Mean

μ or μ_x (read μ sub x) is the population mean

$$\mu_x = \frac{\sum x}{N}$$

Population Standard Deviation

σ or σ_x (read σ) is the population standard deviation

$$\sigma_x = \sqrt{\frac{\sum (x - \mu)^2}{n}}$$

Recognizing the Symbols is very Important

The formulas for each term are listed for your reference. **In this course we will use a calculator to find the mean and standard deviation given a set of data.** It is important that you recognize the symbols and what they stand for. The calculator lists the answer to calculations using symbols for the terms not the names.

When do I use \bar{x} and when do I use μ_x

The sum of all the data $\sum x$ divided by the number of data points (n or N) will be the mean. For any given set of data the sum of the data is fixed and the number of values in the set is also fixed so the calculation for \bar{x} and μ_x would produce **the same number**.

If the set of data is a **sample**
then the calculation yields a **sample mean** and we label the results \bar{x}

If the set of data is a **population**
then the calculation yields a **population mean** and we label the results μ_x or μ

Example 1A

Find the mean of the following
sample { 2, 5, 17}

the data is from a sample so we use \bar{x}
as the label for **sample mean**

$$\bar{x} = \frac{\sum 2+5+17}{3} = \frac{24}{3} = 8$$

Example 1B

Find the mean of the following
population { 2, 5, 17}

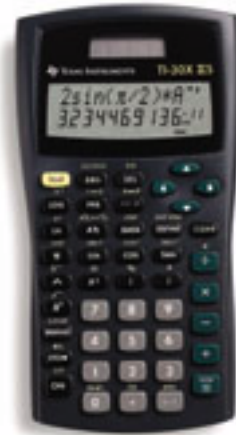
the data is from a population so we use μ_x
as the label for **population mean**

$$\mu_x = \frac{\sum 2+5+17}{3} = \frac{24}{3} = 8$$

The Calculator displays only the value of the sample mean \bar{x} for both \bar{x} and μ_x

When you use the statistics functions on your calculator to find the mean you put the data into the calculator and the calculator returns a value for \bar{x} only. The calculator does not know if the data was a sample or a population. It does know in **either case that the answers are the same** so it saves display space by listing the answer for \bar{x} . It is up to the student to look and see if the data was a population or a sample. The wording of the problem will let you know if you have a sample or population. If the data is from **a sample** use \bar{x} . If the data is from **a population** read the **calculator value for but use μ_x notation**.

Introducing the TI30 Sx



Most of the keys perform two different functions

Each key has a label printed directly on the face of the key. Pushing that key will cause the calculator to perform whatever function is stated on the face of the key. Many keys have a word or symbol printed in color above the key. There is a colored key with the label 2^{nd} in the upper left of the calculator which is colored (mine is yellow). Pressing the colored 2^{nd} key renames each key to the colored label above the key.

Examples

Pushing the x^2 key causes the calculator to square a number. The x^2 key has the $\sqrt{\quad}$ symbol (square root) printed above it. **Pushing the 2^{nd} key and then pushing the x^2 key** causes the calculator to take the square root of a number.

Pushing the DATA key causes the calculator to start asking for data to be keyed into the calculator. The DATA key has the word STAT printed above it. **Pushing the 2^{nd} key and then pushing the DATA key** causes the calculator to open the STAT menu.

Important Keys for the Statistics Class

The **CLEAR** key is often used to clear the display window. **It will not clear menus.**

The $\overset{\text{ENTER}}{=}$ key is used to accept a selection in a menu and exit the menu.

The right and left arrow keys \blacktriangleleft or \blacktriangleright at the top left of the calculator move the underline right or left when you are inside a menu. The up or down arrow keys \blacktriangleup or \blacktriangledown at the top left of the calculator allow you to move the cursor up or down a list of data.

Preparing the TI30 Sx for use



Selecting 1 variable statistics

The Stat 300 course is almost entirely a **single variable course**. This means that the data values are labeled in terms of a single variable x . Courses that label data with one variable use calculations that the STAT menu refers to as **1 variable statistics**. Some topics in a statistics courses use data in pairs that are labeled with x and y variables. The use of paired data with 2 variables x and y require calculations that the STAT menu refers to as **2 variable statistics**.

We **always start** our calculations by **setting the calculator** to perform **1 variable statistics**.

Step 1. Push the On Button.

Step 2: Enter the STAT MENU: Push the 2nd key and then the STAT key. The STAT key is the same as the the DATA key if the 2nd key has been pushed.

Step 3: The phrase “1-var” should be underlined. If it is push the enter button. This selects **1 variable statistics**. If the phrase “1-var” is not underlined then use the right or left arrow keys  or the  to move the underline under the phrase “1-var” and then hit enter.



Note: This procedure should be done first each time you turn the calculator on.

Note: If you get an Error Message while using the calculator you may need to redo this procedure.

Erase the calculator of all old data (clear all data)

Step 1. Push the **On Button**.

Step 2: Enter the **STAT MENU**: Push the 2nd key and then the **STAT key**. The STAT key is the same as the the DATA key if the 2nd key has been pushed.

Step 3: Use the arrow keys  or the  key to move to the underline under third choice “**clrdata**” and hit enter. **This erases the data from past use**. If this step has been done correctly then there will be no data in the data locations when you start to enter data.

Input New Data for **single values of x**

This technique is used for **small data sets**. We put each value for **x** in **separately**. Since **each value of x is put in separately** the frequency for each value is **1**. The calculator is programmed to have **FRQ = 1** as the **default for a frequency of 1**.

Step 1: **Erase (clear) the calculator of old data.**

2nd key, then the STAT key then “clrdata”

Now input the new data into the calculator’s data locations.

Step 2: Push the Data button. You will see $x_1 =$ with a blinking rectangle after the = sign.

Step 3: **Enter the first value for x into $x_1 =$** and press the down arrow key ▼.

Step 3A. **The frequency of x_1 is already shown as FRQ= 1. This is the default value.** Push the down arrow key ▼.

Step 4. The calculator will now show $x_2 =$ with a blinking rectangle after the = sign. **Enter the second value for x into $x_2 =$** and press the down arrow key ▼.

Step 4A. **The frequency of $x_2 =$ is already shown as FRQ= 1. This is the default value.** Push the down arrow key ▼.

Step 5: Continue entering the rest of the data. Enter x_3 **and its frequency of 1**, enter x_4 **and its frequency of 1**, and so on until you have entered all the data.

Stop after you have keyed in the last value for x and it’s frequency.

If you keyed in 8 values of x and their frequencies then a $x_9 =$ will be showing in the display window.

To exit this procedure you can push the data button.

To review the data you have just put in press the **DATA** key.

Use the The up or down arrow keys ▲ or ▼ at the top left of the calculator to move the curser up or down the list of data.

**Finding the Mean and Standard Deviation from the calculator
after the x values and frequencies have been keyed into the calculator**

The statvar button


Step 1: Push the **statvar** button.

Step 2: A horizontal menu of symbols is displayed. n \bar{x} S_x σ_x $y \Rightarrow$


Find the value for N or n

An underline is under the n. This looks like \underline{n} . This indicates the number of data bits put into the calculator. It does not know if the data is from a sample or a population.


Find the value for \bar{x} or μ_x

Use the right arrow button  to move the underline under the \bar{x} symbol and have the value for \bar{x} displayed. An underline under the \bar{x} looks like $\underline{\bar{x}}$. The calculator uses the symbol \bar{x} whether the data is from a sample or a population. If the data is from a sample the value displayed for \bar{x} represents the sample mean. If the data is from a population the value displayed for \bar{x} represents the population mean μ_x . Remember that the value for \bar{x} really represents μ_x if the data is from a population.

Find the value for S_x

Use the right arrow button  to move to the underline under the S_x symbol and have the value for the **Sample Standard Deviation** displayed. An underline under the S_x looks like $\underline{S_x}$.

Find the value for σ_x

Use the right arrow button  to move to the underline under the σ_x symbol and have the value for the **Population Standard Deviation** displayed. An underline under the σ_x looks like $\underline{\sigma_x}$.

Note: The calculator does not know if the data is from a sample or a population so it computes and displays both s_x and σ_x . Only one of the values of s_x or σ_x can be used in a problem as the data is either from a sample or a population. It is up to you to select the correct one based on the wording in the problem.

To exit this procedure you can push the clear button.

The data you have keyed in **will be saved**
until you clear it using the “**clear all data**” procedure

Calculator Practice for the Mean and Standard Deviation

Example 1

Single values of x from **Sample Data**

Find the mean and standard deviation for the **sample data** below.

12 5 11 9 6 2 10 3

Step 1: Clear the old data from the calculator.

Step 2: Enter each single x value for the **sample data** above. The frequency for each x will be **one**. The default frequency in the calculator is **FRQ = 1** so you will not have to enter each frequency.

Step 3: Push the **statvar** key. Select the correct values based on **sample data**.

$n = 8$	$\bar{x} = 7.25$	$S_x = 3.77$
sample	sample	sample
size	mean	standard
		deviation
		(rounded off)

Example 2

Single values of x from **Population Data**

Find the mean and standard deviation for the **Population data** below.

2 5 13 1 4 3 8

Step 1: Clear the old data from the calculator.

Step 2: Enter each single x value for the **sample data** above. The frequency for each x will be **one**. The default frequency in the calculator is **FRQ = 1** so you will not have to enter each frequency.

Step 3: Push the **statvar** key. Select the correct values based on **sample data**.

$N = 7$	$\mu_x = 5.14$	$\sigma_x = 3.83$
populaion	population	population
size	mean	standard
	(rounded off)	deviation
		(rounded off)