Introductory Statistics Tutorial

Calculator Skills

1. We presume you know how to add, subtract, multiply and divide.

2. Scientific calculators have a built-in order of operations and the equals sign indicates the end of data entry, as well as an instruction to calculate up to this point.
   The key sequence:

2		+		3		=		x		4		=

   will do 2 + 3 = 5, then 5 x 4 = 20.

3. Your aim in using a calculator is to be accurate and to be able to produce the answer **without** having to note figures down on paper partway through the calculation.

4. Calculators vary. Make sure you understand the **colour coding** on the one you use because each key often has more than one use.

5. There are often several ways of doing the same problem.

Statistical Functions

Calculation of sample means and sample standard deviations (for data not in a frequency table)

1. Put the calculator into **statistics mode**.
   To do this you have to press the MODE key, so find this on your calculator. Once you have done this you have to press another key. This varies from calculator to calculator. There may be a list of mode options printed on the calculator or after the MODE key is pressed a list will appear on the display. Find this list and determine the correct key required for statistics mode. When the calculator is in statistics mode there will be some form of message on the display. This usually takes the form of a small **SD** or **STAT** above or below the main display.

2. Before entering any list of data into the calculator you **must** clear the statistics memories. Pressing the secondary function key (either SHIFT, INV or 2nd FUNCTION) and then pressing AC, SAC or Scl then the equals key will usually do this. If you do not clear the statistics memories, then you may find that there is old data added in with the new data and you get incorrect results. This is because many calculators don't lose their memory when turned off.

3. To enter the data, enter the list one value at a time, pressing the data entry key (DATA, DT or x) after each value (including the last value). When the list is entered you should verify that the correct number of observations was recorded. Some calculators display the number of observations entered so far after each data entry. On other calculators you will need to use the n key. To access the n key you may need to use a secondary function such as SHIFT then 3 or ALPHA then 3. You will need to use a secondary function key for many statistical functions. You will need to learn how to get these functions for your particular calculator.

4. When the list is entered and correct, use

   $\boxed{\bar{x}}$ to find the sample mean, and

   $\boxed{s}$ or $\boxed{\sigma_{n-1}}$ to find the sample standard deviation.

   $\boxed{\sigma}$ or $\boxed{\sigma_n}$ should not be used as these give the population standard deviation and not the sample standard deviation.

Example:
Sample data: 12, 25, 19, 20, 35.
Use your calculator to determine the sample size, the sample mean and the sample standard deviation.

12	DATA	25	DATA	19	DATA	20	DATA	35	DATA

$n = 5$, $\bar{x} = 22.2$, $s = 8.5264$

Exercise 1

Calculate the sample mean and sample standard deviation for the following sets of numbers:

(i)   12, 14, 16
(ii)   2.6, 1.7, 2.9, 1.8, 2.1
(iii)   2, -1, 5, -6, 0, 3
(iv)   15, 12.6, 15, -2, -2, 15
(v)   22.2, -15.5, 25.5, -62, 0, 3.25

Answers to Exercise 1

(i)   14, 2
(ii)   2.22, 0.517
(iii)   0.5, 3.83
(iv)   8.93, 8.520
(v)   -4.425, 32.0013

Calculation of sample means and sample standard deviations (for data in a frequency table)

Many data sets will be presented in a frequency table (see the table below).

x	f
0	5
1	9
2	8
3	3

So that the value 0 does not have to be entered 5 times, calculators have a method for entering data given in the form of a frequency table. A key press is needed between the data value and its frequency. Modern calculators ⟨ **;** ⟩ he ⟨ **,** ⟩ or key.

On most calculators, the secondary function key must be pressed before the "semi-colon" or "comma" key is pressed. On older calculators, ⟨ **x** ⟩ key is pressed between the data value and its frequency.
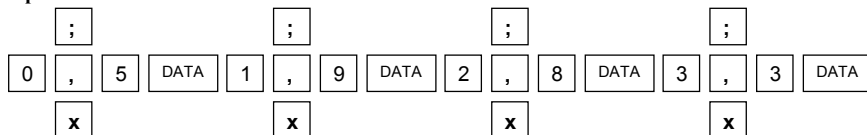
Remember to press the data entry key after each frequency.

Example: Calculate the sample mean and the sample standard deviation for the data in the above frequency table.

Step 1: Check that the calculator is in **statistics mode**.
Step 2: Clear previous data from the statistics memory.
Step 3: Enter the data.

;		**;**		**;**		**;**	
0 **,** **5** DATA	**1** **,** **9** DATA	**2** **,** **8** DATA	**3** **,** **3** DATA
x		**x**		**x**		**x**	

Step 4: Press the sample mean key and then the sample standard deviation key.

Answers: $\bar{x} = 1.36$, $s = 0.952$

Exercise 2

Calculate the sample mean and sample standard deviation for the following data sets:

1.

x	f
0	5
1	11
2	16
3	10
4	8

2.

x	f
8	9
9	16
10	33
11	19
12	13
13	10

Answers to Exercise 2

1. $\bar{x} = 2.1$, $s = 1.216$
2. $\bar{x} = 10.41$, $s = 1.408$