

Calculator Skills

Please note that the equals button acts like an enter button. If it appears at the end of an instruction you need to push it as well otherwise the calculator will not have performed the operation as instructed.

Much of this section will be relevant to older Casio brand of calculators also. Most of the differences will appear when we are accessing the statistics mode in the calculator.

Firstly we will familiarise ourselves with the calculator. Find the key with SHIFT written on it or above it. This key accesses the functions written above the keys (written in yellow writing), as opposed to the functions written on the keys. Find the key marked MODE. The MODE key lets us determine what mode the calculator is operating in. There are many choices other than the normal computational mode that is the default mode for your calculator. We will discuss various modes as we work through this material. For now we will stay in normal mode. To check that you are in normal mode you should look at the screen of your calculator for the small letters at the top.

You may have any of the following appearing on the bottom of your screen. For what we are about to do you want only one of D,R or G and possibly an M.

M	SD	REG	D	R	G	FIX	Sci
---	----	-----	---	---	---	-----	-----

You will always have a D,G or R appearing on your calculator screen. This tells you what measurement you are using when you put in angles and use them to do calculations. Since you are mostly Statistics students we are not going to bother with this stuff. The M indicates that you have something in memory. The other letters indicate that your calculator is working in a particular mode. SD is Statistics mode, REG indicates that you are in regression mode. The letters FIX and Sci stand for a fixed number of decimal places and scientific notation respectively. We want to be in normal mode for this first section so you should find the mode button (it is near the top of the calculator on Casios). Choose mode COMP to get out of the SD and REG modes. Choose NORM to get out of the FIX and Sci modes. On the Casios you will see the following screens

Enter

MODE

 Choose 1 to get out of SD and REG modes

COMP	SD	REG
1	2	3

Enter

MODE MODE

You can make any choice here

Screen

Deg	Rad	Gra
1	2	3

Enter

MODE MODE MODE

Choose 3 and then 1 here to get out of Fix and Sci mode

Screen

Fix	Sci	Norm
1	2	3

Hopefully you now know how to get into normal computational mode. For the next section we will stay in the comp mode which is the default mode of the calculator.

Order of Operations

Modern calculators have been programmed to observe the correct order of operations. For example:

Enter

4 + 3 × 2 =

Screen

4 + 3 × 2	10
-----------	----

This means you can enter long, complicated expressions and the calculator will work out what should be done first. If your calculator does not give you the answer 10 above then it does not follow the order of operations and you will need to be careful when calculating an expression with many parts to it. To enter a negative number in the calculator look for a button marked $\boxed{-}$. To enter a negative number press $\boxed{-}$ and then the number. For example to enter -5 press $\boxed{-}\boxed{5}$. For example, if we wanted to calculate -4×-5 we would do the following:

Enter

$\boxed{-}\boxed{4}\boxed{\times}\boxed{-}\boxed{5}\boxed{=}$

Screen

-4×-5	20
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Bracket Buttons

Most modern calculators also come equipped with a bracket function. Find the buttons marked $\boxed{[}$ and $\boxed{]}$. These open and close brackets and you just enter the

brackets in the appropriate spots as you enter the calculation. Suppose we wanted to calculate $4 \times (3 + 2)^2 \div 20$, then

Enter	Screen
$4 \times ((3 + 2)^2 \div 20) =$	$4 \times (3 + 2)^2 \div 20$ 5

Note that sometimes we can mislead our calculators into doing the wrong thing. In these expressions

$$\frac{4 + 2}{3} \quad , \quad \frac{4}{2+2} \quad , \quad \sqrt{4 + 8} \quad ,$$

there are brackets implied even though they are not written. So we need to put them in when we enter them into the calculator So we enter

$$\frac{(4 + 2)}{3} \quad , \quad \frac{4}{(2+2)} \quad , \quad \sqrt{(4 + 8)} \quad ,$$

Let's do the last one on the calculator

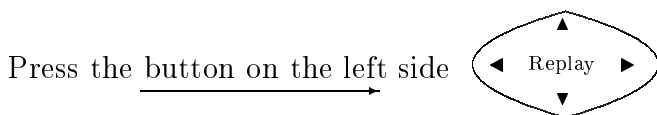
Enter	Screen
$\sqrt{(4 + 8)} =$	$\sqrt{(4 + 8)}$ 3.464101615

Replay

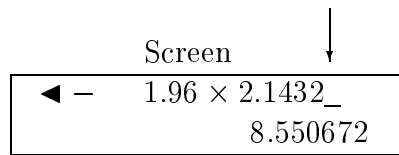
Sometimes in Statistics you will need to do a calculation like $4.35 \pm 1.96 \times 2.1432$. Recall that the \pm in the expression means you want to calculate both the expression with a plus and the one with a minus. You can use the replay button to make this easier.

Enter	Screen
$4.35 + 1.96 \times 2.1432 =$	$4.35 + 1.96 \times 2.1 \rightarrow$ 8.550672

The replay button is at the top of the panel on the front of your calculator.

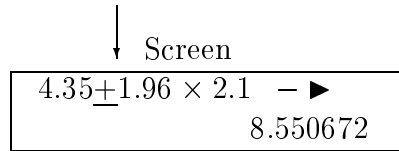


Notice the screen now has a flashing line at the end of the expression



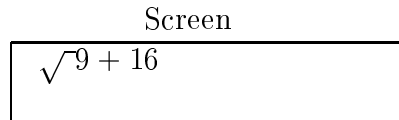
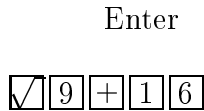
As you push the left button the line moves along the expression and whatever it is under flashes. Move it until it is under the +.

The plus sign + will be flashing

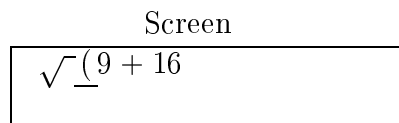
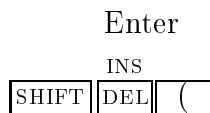


Now push the \square button. The screen now has a minus instead of a plus. Push \square and you have calculated $4.35 - 1.96 \times 2.1432 = 0.149328$.

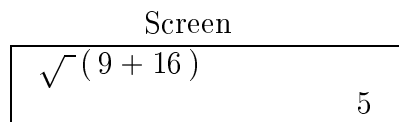
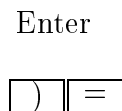
You can also use these buttons to insert or delete things in the expression. For example, suppose I want to calculate $\sqrt{9 + 16}$ and I do the following:



and then I realise that I forgot to put in the brackets. Use the replay buttons until you are under the 9 and then use the delete and insert functions. these functions may be combined in one button or on separate buttons. On the Casio calculators the button is red, next to the ON button and has DEL written on it and INS above it. To insert a bracket before the 9 we move the cursor as described above and then do the following:



Use the replay button (right) to get to the end of the expression and put in another bracket. Enter



Fractions

To enter a fraction find the button $\boxed{a\frac{b}{c}}$. To enter $\frac{4}{5}$ and $2\frac{1}{2}$:

Enter

$\boxed{4}$ $\boxed{a\frac{b}{c}}$ $\boxed{5}$

Screen

$4 \div 5$
0

Enter

$\boxed{2}$ $\boxed{a\frac{b}{c}}$ $\boxed{1}$ $\boxed{a\frac{b}{c}}$ $\boxed{2}$

Screen

$2 \div 1 \div 2$
0

At this point you have entered $2\frac{1}{2}$. Now lets do some more things with this number.

Enter

$\boxed{=}$ to get the screen

Screen

$2 \div 1 \div 2$
 $2 \div 1 \div 2$

To change $2\frac{1}{2}$ from a mixed number to an improper fraction;

Enter

$\boxed{\text{SHIFT}}$ $\boxed{a\frac{b}{c}}$ to get the screen

Screen

$2 \div 1 \div 2$
 $5 \div 2$

Enter

$\boxed{a\frac{b}{c}}$ to get the screen

Screen

$2 \div 1 \div 2$
2.5

Now we get the decimal equivalent of $2\frac{1}{2}$, that is 2.5. Enter $\boxed{a\frac{b}{c}}$ again and we get back to the mixed number form of the fraction.

Enter

$\boxed{a\frac{b}{c}}$ to get the screen

Screen

$2 \div 1 \div 2$
 $2 \div 1 \div 2$

Try this one:

Enter

4	$\frac{b}{c}$	5	=
---	---------------	---	---

Screen

4 $\frac{b}{c}$ 5	4 $\frac{b}{c}$ 5
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Enter

$\frac{b}{c}$

Screen

4 $\frac{b}{c}$ 5	0.8
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Enter

$\frac{b}{c}$

Screen

4 $\frac{b}{c}$ 5	4 $\frac{b}{c}$ 5
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Scientific Notation

Do this calculation

Enter

1	\div	9	8	7	6	5	4	3	2	1	=
---	--------	---	---	---	---	---	---	---	---	---	---

Screen

1 \div 987654321	1.0125 $\times 10^{-09}$
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Notice the little $\times 10^{-09}$ in the corner of the bottom part of the screen. This means that the answer to this calculation is 1.0125×10^{-9} . This says that the number is really 1.0125 with the decimal place shifted 9 places to the left, i.e

$$0.0000000010125$$

Now do the calculation 98765×987654321 to get the answer $9.754567901 \times 10^{13}$ on your screen. The little 13 tells you that the answer is 9.75456790 with the decimal place shifted 13 places to the right, i.e.

$$97545679010000$$

Keep an eye out for those little numbers!!

Memory

You have 10 memory slots in your calculator if you have a Casio *fx-82 SM*. They are called A,B,C,D,E,F,X,Y,M and ANS.

A,B,C,D,E,F,X and Y all work the same way when you are in Comp mode as we are in now. They are accessed by using the $\boxed{\text{RCL}}$ button and the sto function written above it in combination with the letters which are written above some of the keys on the upper section of your calculator in a different colour font than the functions accessed by the $\boxed{\text{SHIFT}}$ key. To put something into one of these memories you first need to have it as an answer on the screen. For example:

Enter	Screen
$\boxed{4} \boxed{\times} \boxed{6} \boxed{=}$	4×6 24

To store in memory A.

Enter	Screen
$\boxed{\text{SHIFT}} \boxed{\text{RCL}} \boxed{\text{A}}$	$4 \times 6 \rightarrow \text{A}$ 24

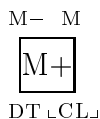
and 24 will be placed in A. To recall it use;

Enter	Screen
$\boxed{\text{RCL}} \boxed{\text{A}}$	$\text{A} =$ 24

To use it in an equation you don't need to recall it you can tell the calculator to use whatever is in the particular memory slot you want to use by using the key with ALPHA written above it. So suppose we now wanted to do 120×24 where 24 is the number in A.

Enter	Screen
$\boxed{1} \boxed{2} \boxed{0} \boxed{\times} \boxed{\text{ALPHA}} \boxed{\text{A}} \boxed{=}$	$120 \times \text{A}$ 2880

Memory slot M works a little differently. You can do all the same things with M that we just mentioned for A but a bit more as well. Find the button above the AC button that looks like this:



If you press $\boxed{M+}$ it will add whatever is on the screen to whatever is already in M. If you press $\boxed{SHIFT} \boxed{M+}$ it will activate the M- and subtract what is on the screen from whatever is already in the memory M. To determine if M already has something in it look for a small M on your screen.

Enter

will reveal this screen

Screen		
Mcl	Mode	All
1	2	3

Here you can make a choice to clear the mode, the memory or both. We want to clear the memory so we would choose 1.

Enter

will clear all the memory

Screen	
Mem clear	
	0

Finally the memory slot \boxed{ANS} . This is a very short term memory slot. It has in it the last thing shown as an answer on the bottom line of the screen.

Enter

Screen

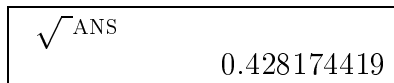
1┘10 + 1┘12	
	11┘60

The number $\frac{11}{60}$ is now in memory ANS. By the way the calculation I just did was $\frac{1}{10} + \frac{1}{12}$. Suppose the sum I wanted to do now was $\sqrt{\frac{1}{10} + \frac{1}{12}}$. I can do this by doing the following

Enter



Screen



Once I press the $\boxed{=}$ button the new answer will get put into the ANS memory.

Statistics Mode

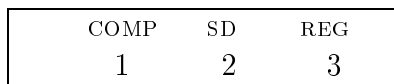
Please note that the equals button acts like an enter button. If it appears at the end of an instruction you need to push it as well otherwise the calculator will not have performed the operation as instructed.

We will now get our calculators into Stats Mode. Find the mode button on your calculator. Most calculators will either give you a choice when you press the MODE button or will have the various modes written somewhere on the calculator face. For the Casio *fx-82 SM* when you press the mode button a choice will appear on the screen

Enter



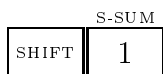
Screen



Choose 2 here by pressing the $\boxed{2}$ button. Somewhere on your screen there should now appear a small SD. Once we are in SD mode the memory of the calculator works differently. M is now working as a place to store your list of data and most of the other memories are used by the calculator to store various numbers associated with that data. The only memory available to you when you are in SD mode is the ANS memory. The inside of the lid of your calculator is often a useful source of information. In some calculators there is a double sided card slotted into the lid with information on both sides; for others it is just a one sided sticker.

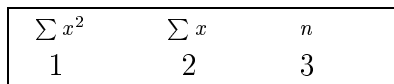
The first thing we are going to do is check whether we already have data stored in the calculator. Remember that turning the calculator off does not clear the memory!!! To check the number of data on a Casio *fx-82 SM*.

Enter



to reveal this screen

Screen



Here you can make a choice to find the sum of the x 's squared, the sum of the x 's or the number of data entered. We want the number of data so we would choose 3.

Enter Screen

3	=
---	---

will tell you the number of data

n	??
---	----

If you don't get zero appearing on your screen it means you already have something in the memory and you need to clear it. To clear the Stats memory you do the same as when you cleared the M memory i.e.

Enter Screen

SHIFT	MODE CLR
-------	----------

will reveal this screen

Scl	Mode	All
1	2	3

Here you can make a choice to clear the mode, the stats or both. We want to clear the stats so we would choose 1.

Enter Screen

1	=
---	---

will clear all the memory

Stat clear	0
------------	---

Now we are ready to start entering data. The $M+$ button puts a piece of data into the stats memory. Lets enter the numbers 10,12 and 14

1	0	M+	1	2	M+	1	4	M+
---	---	----	---	---	----	---	---	----

Pushing the $M+$ button will enter whatever is written at the top of the screen into your data list. So if you push $M+$ twice it will enter the number twice, etc. If you make a mistake then you can correct the data and check it also. More on this later. Notice that after you enter a piece of data the calculator tells you how many you currently have stored in it. After you entered 14 above, you should have appearing on your screen $n=3$.

To get the numerical summaries of your data, including the mean and the standard deviation you need to do the following on the new Casio

Enter Screen

SHIFT	S-VAR	2	=
-------	-------	---	---

to reveal the screen

\bar{x}	$x\sigma_n$	$x\sigma_{n-1}$
1	2	3

The mean has the symbol \bar{x} , so to get the mean you would

Enter

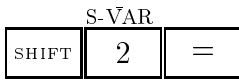


Screen



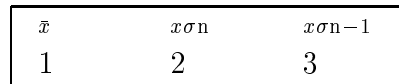
To get the standard deviation of the data you need to find the $x\sigma_{n-1}$ symbol. So to get the standard deviation first

Enter



to reveal the screen

Screen

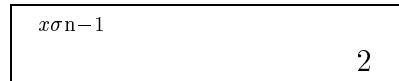


and we would now choose 3 since that is the number below the symbol for the standard deviation.

Enter



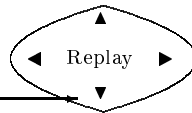
Screen



Your calculator can give you further information about your data which you wont really need for STAT170. The most common things that it will also calculate for you are the sum of all the data and the sum of the squares of the data, these will appear as the expressions $\sum x$ and $\sum x^2$. These summs are accessed using a similar sequence to the one we used to get the number of data.

To check the data currently entered in your calculator we use the up and down arrows on the replay button. This is a new feature of the Casio calculators.

Press the button on the lower edge to scroll through your data



Pushing this edge once should show you that the first piece of data and the screen will show

Screen



Pushing it again and the screen will show that that peice of data has frequency 1.

Screen

Freq1=	1
--------	---

Push the button again and you should get your second piece of data etc. If you needed to correct an entry, use the above process to pull the entry to the screen. Suppose we wanted to change the 12 we entered above to a 13. We would push the down button on the replay until we had the screen

Screen

x2 =	12
------	----

Then we simply type in 13. So you would

Enter

1	3	=
---	---	---

Screen

x2 =	13
------	----

Our data set now consists of 10, 13 and 14. Of course now that we have changed one piece of data our mean and standard deviation will be different.

Most calculators, if they are not very old will have the ability to do another type of Stats calculation that you will meet later in STAT170. This is Linear Regression, but since you will mostly be using a computer to deal with the sort of data that is required to do linear regression we will not learn how to do these calculations on the calculator.

This is the end of the calculator section. Don't forget to clear your data.

Enter

	MODE	CLR
SHIFT		

will reveal this screen

Screen

Scl	Mode	All
1	2	3

If you just wanted to clear the stats memory and stay in SD mode then you could

Enter

1	=
---	---

will clear all the memory

Screen

Stat clear	0
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Or if you wanted to get back into the normal computational mode of the calculator

you could instead choose

Enter



will clear all the memory
and reset the mode

Screen

