

Statistical Simulations - 4

This resource was written by Derek Smith with the support of CASIO New Zealand. It may be freely distributed but remains the intellectual property of the author and CASIO.

Select RUN mode from the main menu by using the arrow keys to highlight the RUN icon or pressing 1.



A programme needs to be entered into the **PRGM** mode to simulate long run probability and hence you can work with some practical data regarding the **Central Limit Theorem**.

This programme is entered in using the program keys in **PRGM** mode

"RELATIVE FREQUENCY".

ViewWindow 1,126,0,-0.01,1.01,0.1
" ".

Lbl 0
"ENTER PROBABILITY".

? → A.

If A<0.

Then "NONSENSE".

Goto 0.

Else If A>1.

Then "NONSENSE".

Goto 0.

Else Graph Y=A.

0 → K.

0 → N.

Lbl 1.

Isz N.

N>126 => Goto 2.

Ran# → R.

R<A => K+1 → K.

Plot N,K□N.

Goto 1.

Lbl 2.

0 → Z.

Lbl 3.

Isz Z.

Z<50 => Goto 3.

"RELATIVE FREQUENCY".

K ÷ N.



F3



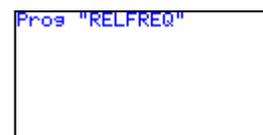
Type in the name.
Shift VARS for
PROGRAMMING keys.



Once the programme is entered then return to Run mode and run the programme.

Type in Prog "REL FREQ"

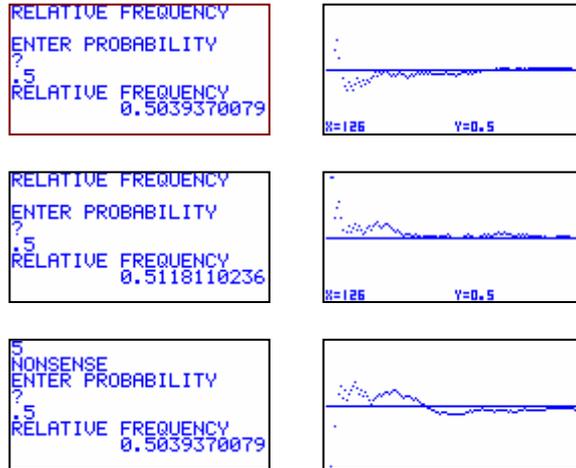
This programme simulates long run probability for any probability between 0 and 1



The more time that you execute this programme the more data collected and the averages collected will begin to form a normal distribution curve.

Example: Enter in a probability of 0.5 and run the programme 50 times [i.e. 50 times with a probability of 0.5 each time.]

Here are some examples of what you will see.



Construct a Stem & leaf graph and collate your results. Of course the more trials that you do the better the overall results, so share yours with another student (or two).

Now calculate the mean (average) of all of these means (averages) This should be very close to 0.5 and the standard deviation very close to $\sqrt{(0.25/n)}$ where n is the number of data you have collected, e.g.50 if you just used your own data.

How close is your result to the theoretical answer – I would say that it was close.

Try the same with other values for the probability, p (say) Then the theoretical value that the average of all the sample averages will be:

$$\sqrt{(p(1-p)/n)}$$

Does this formula remind you of anything? Binomial Distribution?