

Binomial Probabilities.

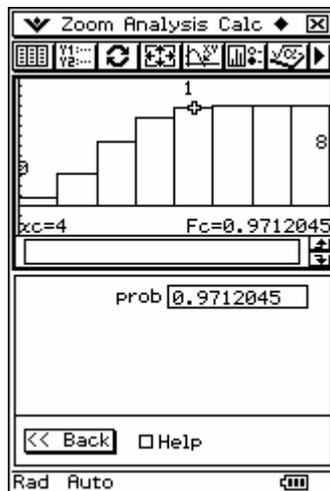
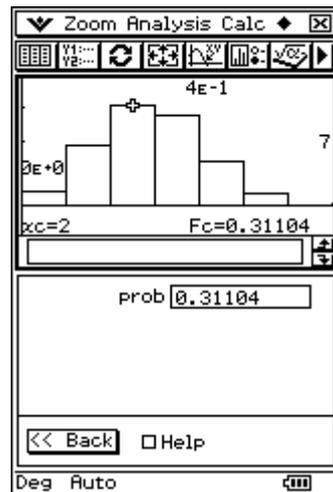
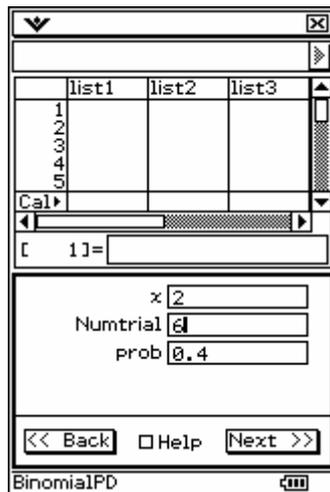
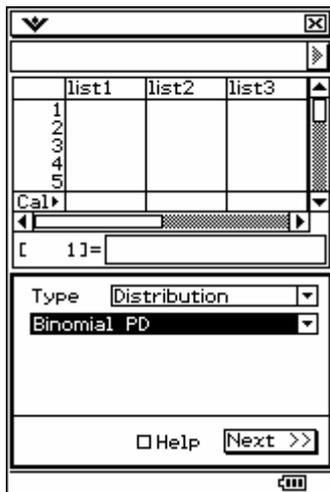
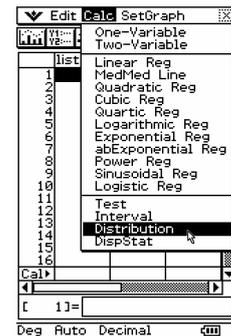
Let Y be the number of successes in n trials of some action for which the binomial assumptions hold. If p is the probability of one success in a single trial then:

$$P(Y = r) = \binom{n}{r} p^r (1 - p)^{n-r}$$

$$P(Y \leq r) = \sum_{k=0}^r \left[\binom{n}{k} p^k (1 - p)^{n-k} \right]$$

Computing a binomial probability – the CP way OS 3.0.

If you need to compute a binomial probability (single or cumulative) the CP 300 offers a very user friendly wizard. Go to the Stat application and the Calc menu and then tap Distribution. You can use the lovely wizard that will compute the required probabilities and also graph the distributions associated with them (which are traceable and you can take off other values you might require).

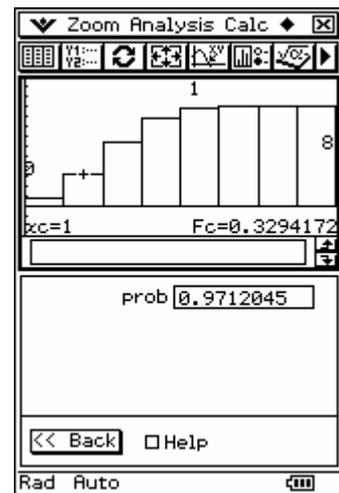


Computing the number of successes(r) given n and p and a probability.

The previous process will also allow you to solve problems where the number of successes (r) is the unknown quantity.

Simply choose an arbitrary value for the number of successes (x, that is less than Numtrial) and then make the graph and trace it.

This will work for either Binomial PD or CD.



Computing the number of trials (n) given r and p and a probability.

The previous process will also allow you to solve problems where number of trials (n) is the unknown quantity and r and p are known.

To do this use a trial and error approach, try a value of n, compute it and then press tap Back and try another value of n, larger or smaller than the previous depending on the previous result.

This will work for either Binomial PD or CD.

A different approach to consider.

At this point, BinomialPD and BinomialCD are **commands** not **functions** in the CP 300. Hence their arguments can only accept numerical values.

However, CP 300 allows the user to define functions. So, if you:

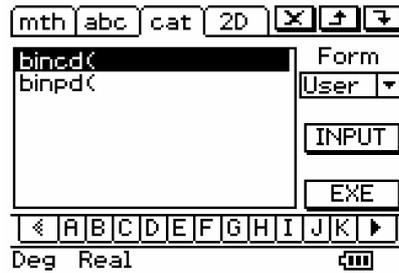
- do not want to use the wizard as shown above or
- if you have to solve a problem where you need to compute the number of trials (n) given the other parameters, you can proceed as follows.

The CP 300 allows you to define any function you like and so you can define the following functions:

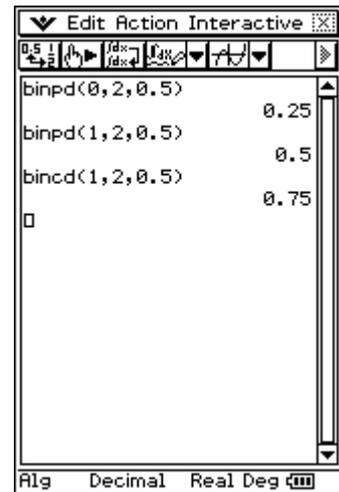
$$\text{Define binpd}(r, n, p) = nCr(n, r) \times p^r \times (1-p)^{n-r}$$

$$\text{Define bincd}(r, n, p) = \sum_{k=0}^r (nCr(n, k) \times p^k \times (1-p)^{n-k})$$

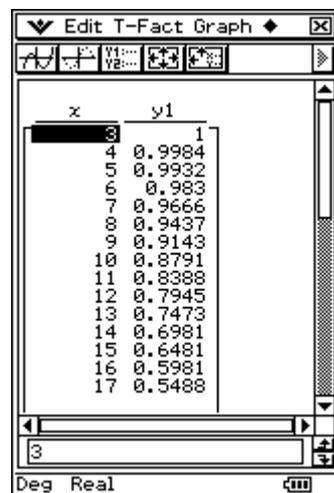
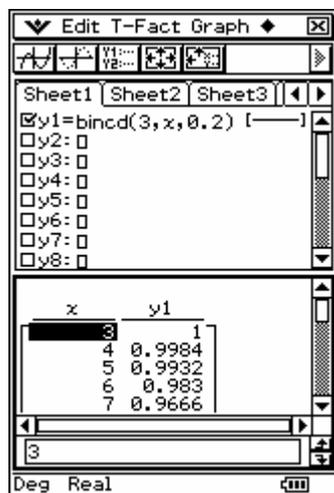
Once defined, these functions are always ready for use and can be typed in or called up using the User-Defined section of the CATalogue.



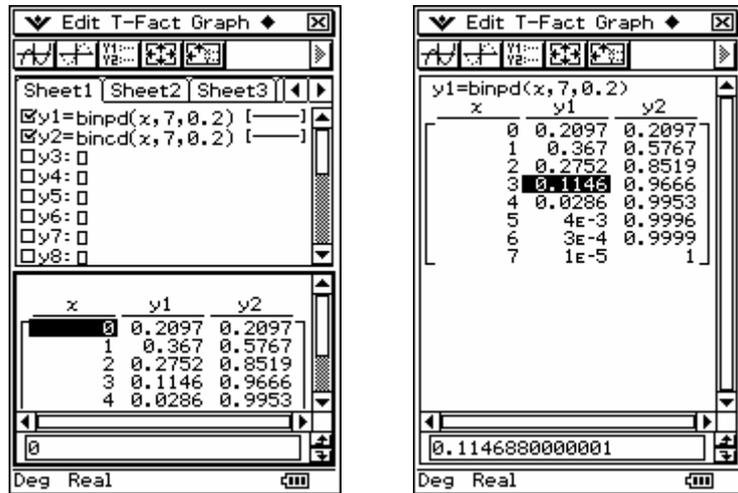
You can then use these functions to compute in a number of ways. Firstly, as speedy way to do what was shown in the first section.



You can also enter the functions in the Graph and Table mode and set whichever the unknown parameter is to be x as shown below.



This also allows us to see the numerical values of binomial distributions (both single value and cumulative) - simply make the first element in the argument x . This also offers an alternative way to find the number of successes given the other parameters.



Using these functions in the Spreadsheet.

Note also that these functions can be used in the spreadsheet as seen below. This way we can change just the values of n and p and the rest of the spreadsheet updates.

