Stats: Cumulative Binomial Notes

We can find probabilities like P ($X \leq 3$) on a calculator, but note this for fx-991EX Classwiz calculators:

> **Limitation:** The Casio fx-991EX Classwiz can only work out P ($X \leq x$).
>
> To find the probability of P ($X \geq x$), we must calculate 1 – the correct P ($X \leq x$).

E1: John wins tennis matches with probability 0.3. He plays 20 tennis matches in a month. Find the probability that he wins 4 or fewer of the matches.

Method X~B (20, 0.3). The probability required is: P ($X \leq 4$).

Casio fx-991EX Classwiz	Casio fx-CG50
1) Select 7:Distribution on the menu	1) Select Statistics 2 from the menu
2) Press DOWN and select 1:Binomial CD	2) Press F5 for DIST and F5 again for Binomial
3) Select 2:Variable	3) Press F2 for Bcd and F2 for Var
4) Input x, N and p [N is the number of trials]	4) Input Lower, Upper, Numtrial and p [Lower: smallest value to be included] [Upper: largest value to be included] [Numtrial: number of trials]
5) Press =	5) Press EXE
6) Press AC to return to the input section	6) Press EXIT to return to the input section

Casio fx-CG50 owners input 'Lower' as 0, 'Upper' as 4, 'Numtrial' as 20 and 'p' as 0.3.

We get 0.238 to 3sf.

E2: Zakira makes a spinner that lands on red with probability 0.4. She spins it ten times. Find the probability that it lands on red fewer than 6 times.

Method X~B (10, 0.4). The probability required is: P ($X < 6$). As the variable is discrete, this is the same as P ($X \leq 5$).

We get 0.834 to 3sf.

E3: A machine produces oversized components with probability 0.25. A sample of 15 components is taken. Find the probability that more than 7 of them are oversized.

Method So X~B (15, 0.25). Then form the probability: P ($X > 7$).

This is not of the form "P ($X \leq x$)". Rewrite the probability as P ($X \geq 8$).

- Casio fx-CG50 owners input 'Lower' as 8, 'Upper' as 15, and Numtrial and p as usual. We get 0.0173
- Casio fx-991EX Classwiz owners must find the probability of X being below 8 and subtract it from 1.
  For X to be below 8, it must be 7 or less. So find P ($X \leq 7$) and subtract it from 1.
  To subtract from 1, press MENU, select 1:Calculate, and type 1 – Ans.
  We get 1 – 0.9827 = 0.0173.