Stats: Cumulative Binomial Notes NEW

We can find probabilities like P (X ≤ 3) on a calculator. Note this for fx-991CW Classwiz calculators:

> **Limitation:** The Casio fx-991CW Classwiz can only calculate P (X ≤ x).
>
> To find the probability of P (X ≥ x), we work out 1 – the correct P (X ≤ 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   The distribution is X~B (20, 0.3). The probability required is P (X ≤ 4).

Casio fx-991CW Classwiz	Casio fx-CG50
1) Select Distribution on the HOME menu	1) Select Statistics 2 from the menu
2) Select 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) Select ● Execute and press EXE	5) Press EXE
6) Press EXE to return to the input section	6) Press EXIT to return to the input section

Casio fx-CG50 users 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 ≤ 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 ≤ x)". Rewrite the probability as P (X ≥ 8).

- Casio fx-CG50 owners input 'Lower' as 8, 'Upper' as 15, and Numtrial and p as usual. We get 0.0173
- Casio fx-991CW 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 ≤ 7) and subtract it from 1. To subtract from 1, press HOME, select Calculate, and type 1 – Ans. We get 1 – 0.9827 = 0.0173.