

Example 2 Twitter

Given that there is a 0.85 probability that a randomly selected adult knows what Twitter is, use the binomial probability formula to find the probability of getting exactly three adults who know what Twitter is when five adults are randomly selected. That is, apply Formula 5-5 to find $P(3)$ given that $n = 5$, $x = 3$, $p = 0.85$, and $q = 0.15$.

Solution

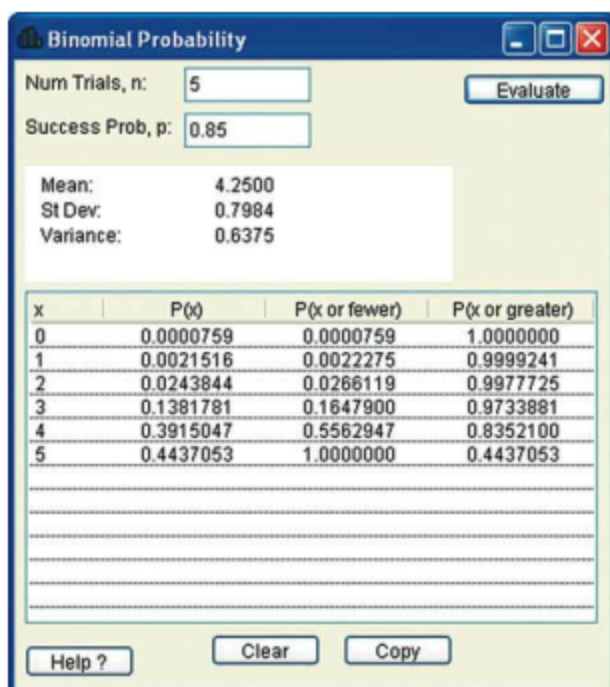
Using the given values of n , x , p , and q in the binomial probability formula (Formula 5-5), we get

$$\begin{aligned} P(3) &= \frac{5!}{(5-3)!3!} \cdot 0.85^3 \cdot 0.15^{5-3} \\ &= \frac{5!}{2!3!} \cdot 0.614125 \cdot 0.0225 \\ &= (10)(0.614125)(0.0225) = 0.138178 \\ &= 0.138 \text{ (rounded)} \end{aligned}$$

The probability of getting exactly three adults who know Twitter among five randomly selected adults is 0.138.

Calculation hint: When computing a probability with the binomial probability formula, it's helpful to get a single number for $n! / [(n-x)!x!]$, a single number for p^x , and a single number for q^{n-x} , then simply multiply the three factors together as shown in the third line of the calculation in the preceding example. Don't round too much when you find those three factors; round only at the end.

Method 2: Using Technology STATDISK, Minitab, Excel, StatCrunch, SPSS, SAS, and the TI-83/84 Plus calculator are all technologies that can be used to find binomial probabilities. (Instead of directly providing probabilities for individual values of x , SPSS and SAS are more difficult to use because they provide *cumulative*

STATDISK


x	P(x)	P(x or fewer)	P(x or greater)
0	0.0000759	0.0000759	1.0000000
1	0.0021516	0.0022275	0.9999241
2	0.0243844	0.0266119	0.9977725
3	0.1381781	0.1647900	0.9733881
4	0.3915047	0.5562947	0.8352100
5	0.4437053	1.0000000	0.4437053

MINITAB

x	P(x)
0	0.000076
1	0.002152
2	0.024384
3	0.138178
4	0.391505
5	0.443705

EXCEL

	A	B
1	0	7.594E-05
2	1	0.0021516
3	2	0.0243844
4	3	0.1381781
5	4	0.3915047
6	5	0.4437053

TI-83/84 PLUS

L1	L2	L3	2
0	7.6E-5		
1	.00215		
2	.02438		
3	.13818		
4	.3915		
5	.44374		
L2(7) =			