

3.2 Binomial Probability using Excel

If the Excel spreadsheet is not showing below, download the Excel spreadsheet from [here](#).

How to find the Binomial probability, mean and standard deviation

Suppose you were given the task of determining the probability of observing the five white cars entering the intersection of Blackstone and Shaw. From previous information you believe that the probability of a white car entering the intersection is 0.33. You will observe the next ten cars entering the intersection. What is the probability five of the cars are white?

P(X = 5) probability statement

To determine the probability that out of ten cars that enter the intersection, five vehicles are white. We must realize that this is a binomial distribution. It is a binomial distribution because the automobiles are white or not white, and each vehicle entering the intersection is independent of all other cars. To use Excel to compute the binomial probability, enter the following formula into a cell.

=binom.dist(5, 10, 0.33, False)

False indicates that you want one probability, $P(X = 5)$. True, would indicate you want the probabilities of 0 thru 5 added together, $P(X \leq 5)$.

P(X = 5) = 0.1332 rounded to four decimal places

The Mean, is $\mu = np = 10 * 0.33 = 3.3$.

Enter =10*0.33 into a cell to compute the mean.

The Standard deviation is $\sigma = \sqrt{np(1-p)}$. To compute the standard deviation in the Excel spreadsheet, enter the formula into a cell

=sqrt(10*0.33*(1-.33))

The standard deviation is 1.486943 or 1.4869 rounded to four decimal places.

The probability that at least six white cars enter the intersection is calculated below. The probability statement is **P(X ≤ 6)**.

=binom.dist(6, 10, 0.33, true)

0.981451

0.9815 rounded to four decimal places

The probability that at least four white cars pass through the intersection is calculated below. The probability statement is **P(X ≥ 4)**.

=1 - binom.dist(3, 10, 0.33, true)

0.431632

0.4316 rounded to four decimal places

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