

How can I use the POISSON function in Excel to calculate the probability of a certain number of events occurring within a given time frame?

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The POISSON function in Excel is a statistical tool that can be used to calculate the probability of a certain number of events occurring within a given time frame. This function is based on the Poisson distribution, which is a mathematical model commonly used to analyze the frequency of rare events. By providing the necessary parameters, such as the expected average number of events and the specific time frame, the POISSON function can quickly and accurately determine the probability of a particular number of events happening. This can be useful in various fields, such as finance, insurance, and business, for predicting and planning for future events. Overall, the POISSON function in Excel is a powerful tool for calculating probabilities and can assist in making informed decisions and projections.

Returns the Poisson distribution. A common application of the Poisson distribution is predicting the number of events over a specific time, such as the number of cars arriving at a toll plaza in 1 minute.

Important: This function has been replaced with one or more new functions that may provide improved accuracy and whose names better reflect their usage. Although this function is still available for backward compatibility, you should consider using the new functions from now on, because this function may not be available in future versions of Excel.

For more information about the new function, see [POISSON.DIST function](#).

Syntax

POISSON(x,mean,cumulative)

The POISSON function syntax has the following arguments:

X Required. The number of events.

Mean Required. The expected numeric value.

Cumulative Required. A logical value that determines the form of the probability distribution returned. If cumulative is TRUE, POISSON returns the cumulative Poisson probability that the number of random events occurring will be between zero and x inclusive; if FALSE, it returns the Poisson probability mass function that the number of events occurring will be exactly x.

Remarks

If x is not an integer, it is truncated.

If x or mean is nonnumeric, POISSON returns the #VALUE! error value.

If $x < 0$, POISSON returns the #NUM! error value.

If mean < 0 , POISSON returns the #NUM! error value.

POISSON is calculated as follows.

For cumulative = FALSE:



For cumulative = TRUE:

$$CUMPOISSON = \sum_{k=0}^x \frac{e^{-\lambda} \lambda^k}{k!}$$

Example

Copy the example data in the following table, and paste it in cell A1 of a new Excel worksheet. For formulas to show results, select them, press F2, and then press Enter. If you need to, you can adjust the column widths to see all the data.

Data	Description	
2	Number of events	
5	Expected mean	
Formula	Description (Result)	Result
=POISSON(A2,A3,TRUE)	Cumulative Poisson probability with the terms above (0.124652)	0.124652
=POISSON(A2,A3,FALSE)	Poisson probability mass function with the terms above (0.084224)	0.084224