

Poisson Distribution Calculator

The Poisson Calculator makes it easy to compute individual and cumulative Poisson probabilities. For help in using the calculator, read the [Frequently-Asked Questions](#) or review the [Sample Problems](#).

To learn more about the Poisson distribution, read Stat Trek's [tutorial on the Poisson distribution](#).

- Enter a value in BOTH of the first two text boxes.
- Click the **Calculate** button.
- The Calculator will compute the Poisson and Cumulative Probabilities.

Poisson random variable (x)

Average rate of success

Poisson probability: $P(X = x)$

Cumulative probability: $P(X < x)$

Cumulative probability: $P(X \leq x)$

Cumulative probability: $P(X > x)$

Cumulative probability: $P(X \geq x)$

Calculate

Frequently-Asked Questions

[Poisson Calculator](#) | [Sample Problems](#)

Instructions: To find the answer to a frequently-asked question, simply click on the question. If none of the questions addresses your need, refer to Stat Trek's [tutorial on the Poisson distribution](#) or visit the [Statistics Glossary](#). On-line help is just a mouse click away.

+ What is a Poisson experiment?

+ What is a Poisson distribution?

+ What is a Poisson random variable?

- What is the average rate of success?

The average rate of success refers to the average number of successes that occur over a particular interval in a Poisson experiment.

We might be interested in the number of phone calls received in an hour by a receptionist. Suppose she received 1 phone call per hour on average.

If we treated this as a Poisson experiment, then the average rate of success over a 1-hour period would be 1 phone call. Note, however, that our experiment might involve a different unit of time. Suppose we focused on the number of calls during a 30-minute time period. Then, the average rate of success would be 0.5 calls per half hour. Similarly, if we focused on a 2-hour time period, the average rate of success would be 2 calls per 2 hours.

+ What is a Poisson probability?

+ What is a cumulative Poisson probability?

Poisson Distribution: Sample Problems

[Poisson Calculator](#) | [Frequently-Asked Questions](#)

1. Historically, schools in a Dekalb County close 3 days each year, due to snow. What is the probability that schools in Dekalb County will close for 4 days next year?

Solution:

We know the following:

- The Poisson random variable is 4.
- The average rate of success is 3. Here, we define a "success" as a school closing. Since the schools have closed historically 3 days each year due to snow, the average rate of success is 3.

Therefore, we plug those numbers into the [Poisson Calculator](#) and hit the Calculate button. The calculator reports that the Poisson probability is 0.168. That is the probability of getting EXACTLY 4 school closings due to snow, next winter. (The calculator also reports the cumulative probability - the probability of getting AT MOST 4 school closings in the coming year. The cumulative probability is 0.815.)

2. An expert typist makes, on average, 2 typing errors every 5 pages. What is the probability that the typist will make at most 5 errors on the next fifteen pages?

Solution:

We know the following:

- The Poisson random variable is 5.
- The average rate of success 6. This may require a little explanation. We know that the average rate of success is 2 errors for every five pages. However, this problem calls for typing three times as many pages, so we would expect the typist to make three times as many errors, on average. Therefore, average rate of success is 3×2 , which equals 6.

Therefore, we plug those numbers into the [Poisson Calculator](#) and hit the Calculate button. The calculator reports that the $P(X \leq 5)$ is 0.446. In other words, the probability that the typist makes no more than 5 errors is 0.446. (Note that the calculator also displays the Poisson probability - the probability that the typist makes EXACTLY 5 errors. The Poisson probability is 0.161.)

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