What are some real-life examples of the geometric distribution?

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April 28, 2024

RECOMMENDED CITATION

stats writer (2024). *What are some real-life examples of the geometric distribution?*. PSYCHOLOGICAL SCALES. Retrieved from https://scales.arabpsychology.com/?p=140501

The geometric distribution is a mathematical concept that represents the probability of success after a certain number of trials. In real life, this can be seen in various scenarios, such as:
1. Flipping a coin: Each time a coin is flipped, there is a 50% chance of getting either heads or tails. The geometric distribution can be used to calculate the probability of getting a specific outcome after a certain number of flips.
2. Winning a game: In a game of chance, the geometric distribution can be used to determine the probability of winning after a certain number of attempts.
3. Electric power outages: The geometric distribution can be used to analyze the probability of power outages occurring after a certain number of days or hours.
4. Arrival of customers at a store: The geometric distribution can be used to predict the probability of a certain number of customers arriving at a store after a specific amount of time.
5. Number of failures before success: In manufacturing or quality control, the geometric distribution can be used to calculate the probability of a certain number of failures occurring before a successful product is produced.

5 Real-Life Examples of the Geometric Distribution

The is a probability distribution that is used to model the probability of experiencing a certain amount of failures before experiencing the first success in a series of Bernoulli trials.

A Bernoulli trial is an experiment with only two possible outcomes - "success" or "failure" - and the probability of success is the same each time the experiment is conducted.

An example of a Bernoulli trial is a coin flip. The coin can only land on two sides (we could call heads a "success" and tails a "failure") and the probability of

success on each flip is 0.5, assuming the coin is fair.

If a *X* follows a geometric distribution, then the probability of experiencing *k* failures before experiencing the first success can be found by the following formula:

P(X=k) = (1-p)kp

where:

k: number of failures before first successp: probability of success on each trial

In this article we share 5 examples of how the Geometric distribution is used in the real world.

Example 1: Coin Tosses

Suppose we want to know how many times we'll have to flip a fair coin until it lands on heads.

We can use the following formulas to determine the probability of experiencing 0, 1, 2, 3 failures, etc. before the coin lands on heads:

Note: The coin can experience 0 "failures" if it lands on

heads on the first flip.

P(X=0) = (1-.5)0(.5) = 0.5

P(X=1) = (1-.5)1(.5) = 0.25

P(X=2) = (1-.5)2(.5) = 0.125

P(X=3) = (1-.5)3(.5) = 0.0625

Example 2: Supporters of a Law

Suppose a researcher is waiting outside of a library to ask people if they support a certain law. The probability that a given person supports the law is p = 0.2.

P(X=0) = (1-.2)0(.2) = 0.2

P(X=1) = (1-.2)1(.2) = 0.16

P(X=2) = (1-.2)2(.2) = 0.128

Example 3: Number of Defects

Suppose it's known that 5% of all widgets on an assembly line are defective.

We can use the following formulas to determine the

probability of inspecting 0, 1, 2 widgets, etc. before an inspector comes across a defective widget:

P(X=0) = (1-.05)0(.05) = 0.05

P(X=1) = (1-.05)1(.05) = 0.0475

P(X=2) = (1-.05)2(.05) = 0.04512

Example 4: Number of Bankruptcies

Suppose it's known that 4% of individuals who visit a certain bank are visiting to file bankruptcy. Suppose a banker wants to know the probability that he will meet with less than 10 people before encountering someone who is filing for bankruptcy.

We can use the with p = 0.04 and x = 10 to find that the probability that he meets with less than 10 people before encountering someone who is failing for bankruptcy is 0.33517.

Example 5: Number of Network Failures

Suppose it's known that the probability that a a certain company experiences a network failure in a given week is 10%. Suppose the CEO of the company would like to

know the probability that the company can go 5 weeks or longer without experiencing a network failure.

We can use the with $p = 0.10$ and $x = 5$ to find that the probability that the company lasts 5 weeks or longer without a failure is 0.59049.