Expand Your Knowledge: Geometric Probability Distribution; Sociology

Geometric Distribution

Suppose we have an experiment in which we repeat binomial trials until we get our *first success,* and then we stop. Let n be the number of the trial on which we get our *first success*. In this context, n is not a fixed number. In fact, n could be any of the numbers 1, 2, 3, and so on. What is the probability that our first success comes on the nth trial? The answer is given by the *geometric probability distribution.*

GEOMETRIC PROBABILITY DISTRIBUTION

$$P(n) = p(1-p)^{n-1}$$

where n is the number of the binomial trial on which the *first success* occurs ($n = 1, 2, 3, \ldots$) and p is the probability of success on each trial. *Note:* p must be the same for each trial.

Using some mathematics involving infinite series, it can be shown that the **population mean** and **standard deviation** of the geometric distribution are

$$\mu = \frac{1}{p} \quad \text{and} \quad \sigma = \frac{\sqrt{1-p}}{p}$$