

Geometric Distribution

Introduction

If we consider the special case of the negative binomial distribution where $k = 1$, we have a probability distribution for the number of trials required for a single success.

Since the successive terms constitute a geometric progression, it is customary to refer to this special case as the geometric distribution and it is denoted by $g(x; p)$.

The negative binomial distribution reduces to the form

$$b^*(x;1, p) = p(1 - p)^{x-1} \quad x=1, 2, \dots$$

Definition If repeated independent trials can result in a success with probability p and a failure with probability $1-p$, then the probability distribution of the random variable X , the number of the trial on which the first success occurs is given by

$$g(x; p) = p(1 - p)^{x-1} \quad x=1, 2, \dots$$

Example 3.10

If the probability is 0.20 that a burglar will be caught on any given job, what is the probability of being caught for the first time on the fourth job?

Example 3.11

In a certain manufacturing process, it is known that on the average, 1 in every 100 items is defective. What is the probability that 5 items are inspected before a defective item is found?