Discrete Probability Theory Homwework Variant 3 (week 6)

Dimitri Tabatadze · Saturday 06-04-2024

Problem 6.1:

Find the variance of a geometric random variable

Problem 6.2:

Compute the expected value and the variance of a negative binomial random variable with parameters r and p.

Problem 6.3:

If independet trials, each resulting in a success with probability p are performed, what is the probability of r successes occuring before m failures?

Solution

$$p^r \cdot (1-p)^m \cdot \binom{r+m-1}{r}$$

Problem 6.4:

A laboratory blood test is 96 percent effective in detecting a certain disease when it is, in fact, present. However, the test also yields a “false positive” result for 3 percent of the healthy persons tested. (That is, if a healthy person is tested, then, with probability 0.03, the test result will imply that he or she has the disease.) If 2 percent of the population actually has the disease, what is the probability that a person has the disease given that the test result is positive?