STAT 88: Lecture 7 Continued

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Summary of Binomial versus Hypergeometric:

Binomial (n,p)

n = # trials

p = probability of success

sample with replacement

trial has two outcomes < success / failure

n independent trials

X = # successes in sample

$$P(X=k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Binomial formula

Ex. pick 5 cards from a deck with replacement. What is chance you get 2 ace cards?

HG(N, G, n)

N = population size

G = # good elements in pop

n = sample size

sample without replacement

trial has two outcomes < good / bad

n dependent trials

X = # good in sample

$$P(X=g) = \frac{\binom{G}{g}\binom{N-G}{n-g}}{\binom{N}{n}}$$

HG formula

Ex. pick 5 cards from a deck without replacement. what is chance you get 2 ace cards?

3.5. Examples

Problem solving techniques:

- Breaking the problem down into smaller pieces
- Examining the assumptions and hence deciding which distributions can be used
- Organizing the information to identify the parameters of the distributions
- Partitioning events into component pieces
- Using the addition and multiplication rules carefully

Advisor meetings An advisor at a university provides guidance to 10 students. Each student has to meet with her once a month during the school year which consists of nine months.

So each month the advisor schedules one day of meetings. Each student has to sign up for one meeting that day. Students have the choice of meeting her in the morning or in the afternoon.

Assume that every month each student, independently of other students and other months, chooses to meet in the afternoon with probability 0.75.

Question. What is the chance that she has both morning and afternoon meetings in all of the months except one?

Randomized Controlled Experiments (RCE) In a RCE, a simple random sample of half the participants will be assigned to the treatment group (T) and the other half to control (C).

Experiment 1 has 100 participants of whom 20 are men.

Question 1. What is the chance that the treatment and control groups in Experiment 1 contain the same number of men?

Experiment 1 has 100 participants of whom 20 are men.

Experiment 2 has 90 participants of whom 30 are men.

Question 2. What is the chance that the treatment groups in the two experiments have the same number of men?