

STAT2011 Statistical Models

Semester 1, 2012

Week 4 Computer Exercise

This exercise also simulates drawing chips from an urn both with and without replacement. This week we compare the observed frequency of each value (i.e. number of whites in sample) with a theoretical value from a certain distribution. When sampling with replacement, the number of whites should behave like a binomial random variable. When sampling without replacement we should see hypergeometric behaviour. Before you commence, finish off last week's exercise; it will help you with this one. **Comments where required are indicated in boldface.**

1. Create a vector `urn` containing 3 "white" and 7 "black", representing an urn with 3 white chips and 7 black chips.
2. Draw 10000 samples of size 5 with replacement from `urn`, storing each sample in a row of a matrix called `withRep`.
3. Create a vector `Xwith` that has the number of whites in each row of `withRep`. **How long should this vector be?**
4. The command `table(Xwith)` creates a frequency table (i.e. a vector of counts with appropriate labels) of the values in `Xwith`. Using this, obtain a *relative* frequency table (where the relative frequencies add to 1).
5. Read the help page of the function `dbinom()` and hence create a vector `binom.probs` of *predicted* relative frequencies for this example; **are they close to what you observed?**
6. Repeat questions 2 to 5 but sample *without* replacement; create a matrix `withoutRep` and a vector `Xwithout`, and in question 5 use `dhyper()` instead.