**Homework 1**

**Workshop of Genome-Wide Association Studies**

**Wuhan, July 4-9, 2016**

Professor: Zhiwu Zhang

Due on July 4, 2016, 5:00PM, Beijing time

**Objectives**: 1) random variables; 2) derivation of random variables; 3) distribution of random variables; 4) define R functions;

**Hand in:** Email your report (PDF, limited to five page) and R source code (text file) with subject of “GWAS2016HW1” to Dr. Xiaolei Liu ([xll19870827@hotmail.com](mailto:xll19870827@hotmail.com)). Name your files as following:

Homework1\_ firstname\_lastname.pdf and Homework1\_ firstname\_lastname.R

**Grade components**: 1) Hypothesis or statement; 2) Results; 3) Methods; 4 presentation; 5) R source code (clarity, simplicity and documenting comments)

1. Start from any random variables (e.g. normal and uniform), define your own random variable. Name the random variable as your last name and develop a R function to generate the random variable. The input of your R function should include n, which is number variables to be generated, and parameters for the distribution of the random variable you defined. Note: try not to be the same as the known distributions such as Chi-square, F and t.
2. What is the expectation and variance of your random variables?
3. Sample ten thousand observations from the distribution you defined. Illustrate their distribution properties.
4. Sample n (10, 30 or 100 on your own choice) observations from the distribution you defined, calculate their mean. Repeat the sampling ten thousand times. Illustrate the distribution properties of the sample means.
5. Describe the potential application of your distribution in nature.