**Homework 2**

**Statistical Genomics (545)**

**Spring 2025**

Professor: Zhiwu Zhang

TA: Meijing Liang

Due on Monday, March 31, 2025, 3:10PM PST

**Hand in:** Email the link to the published on [preprints.org](https://www.preprints.org/) or [Peer Community Journal](https://peercommunityjournal.org/)) with subject of “StaGen545 HW2” to [Zhiwu.Zhang@WSU.edu](mailto:Zhiwu.Zhang@WSU.edu) and copy to TA ([Meijing.Liang@WSU.edu](mailto:Meijing.Liang@WSU.edu)).

**Objectives**: Publish a paper comparing GWAS methods regarding to statistical power and computing speed. The topics include 1) Statistical power vs. FDR and type I error; 2) mapping resolution; and 3) GWAS methods (GLM, MLM, CMLM, SUPER, MLMM, FarmCPU, and BLINK).

There are many statistical model and computer software packages have been developed for GWAS with different characteristics of statistical power and computing speed. Researchers often have difficulties to a model and software to analyze their data. Beside software learning curves, their concerns include statistical power, false positives, the number of PCs related to population structure, and interaction between models and their data. Your objective is to answer some of these questions with your data or the data that is available for public. Your answers should be scientifically correct. Provide your answer in format of a scientific paper including an attractive, precise and meaningful title (5 points), summary (5 points), introduction (20 points), results (30 points), method (20 points), discussion (10 points), conclusion (5 points), and references (5 points).

**Extra credit**

1. Receive a citation (10 points).
2. Extra GWAS methods (10 points per method)
3. Find another method and demonstrate that it has higher statistical power than BLINK (50 points).