Outline

- What are "Modern" methods? How do they differ?
- Penalization Methods
  - Ridge regression
  - LASSO
  - SCAD
- Model Selection / Averaging

What is Modern Variable Selection

Modern selection avoids the use of multiple testing through penalized coefficients or model ranking.

- Traditional Selection (backward, forward, and best subset selection):
  - Suffer from α inflation
  - Do not address problem of correlated predictors
  - Difficult to decide the appropriate number of predictors
  - Do not have very good out-of-sample performance
  - See: Breiman (1996) Heuristics of instability and stabilization in model selection. Annals of Statistics 24 (6)
  - Also: *The Elements of Statistical Learning* by R. Tibshirani
- Modern Methods
  - Avoid the multiple testing problem
  - Deal better with correlated predictors
  - Can accomodate very high dimensional data (large number of predictors)