HW 8 Problems

Penalized regression

Consider the following model

$y_i = \beta_1 x_{i,1} + \beta_2 x_{i,2} + \cdots + \beta x_{i,100} + e_i$

$e_i \sim N(0, \sigma^2)$

$\beta_1, \ldots, \beta_5 \sim N(0, 2)$

$\beta_6, \ldots, \beta_{100} = 0$

$x_i \sim N_{100}(0, I)$

Simulate data $n = 100$

The following is a ridge type prior

$\beta_j \sim N(0, \tau^{-1}\sigma^2)$

$\tau \sim Ga(a, b)$

The following is a t-prior

$\beta_j \sim N\left(0, \lambda_j^{-1}\tau^{-1}\right)$

$\lambda_j \sim Ga\left(\frac{\nu}{2}, \frac{\nu}{2}\right)$

$\tau \sim Ga(1, 1)$

To do:

Simulate data with 5 true predictors

Compare the following approaches:

(1) Fully Bayes ridge

(2) t-prior with $\nu = 1$

(3) t-prior with $\nu = 0.001$

(4) Frequentist LASSO