Homework 5

STAT 697STA Spring 2023

Due March 22, 2023, 9:40am on Gradescope

1 Reading

- Read sections 2.12, 3.1, and 3.2 of HRW.

2 Questions

1. HRW 2.9
2. HRW 2.10 *start this one in class - it is a more complicated Bayesian model
   - Do parts a,b,c as in the book
   - Read part d, but as it is in the book, it doesn't require output. Instead, for part (d), please explore diagnostics for your fit for the parameters σ_u, σ_v, $\hat{f}(median(r))$, and $\sqrt{\hat{g}(median(r))}$

   Hints:

   - You probably want to use:

     ```
     yOrig=r[-1]-r[-length(r)]
     xOrig=r[-length(r)]
     ```

   - You do want to do transformations, but think carefully about how to back-transform. After it runs, you probably want to back-transform fits for both f and $\sqrt{g}$.
   - Go through the example code and add code for $\gamma, v, \sigma_v, and\ z^g$ in parallel to the existing code for $\beta, u, \sigma_u, and z^f$ (I called z^g w to make it easier to keep track).
   - There are some tricky coding pieces. Here are 2 tricks I found helpful:
     - There are some tricky transformations in this model. I found it helpful to add a 'transformed parameters' section to my model specification that looks like this:

       ```
       transformed parameters {
          vector[n] f; // f function
          vector[n] g; // g function
          f = Y*beta + Z*u;
          g = exp(Y*gamma + W*v);
       }
       ```

     - You can model a variable variance like this:

       ```
       y ~ normal(f,sqrt(g));
       ```