**CSUMB 550 Homework 8**

**Hierarchical Bayesian Linear Regression**

**Due Thursday, December 17, 2015, 10pm**

As I described in class, you have been given a set of data points showing the relationship between percent water and percent fat. Physiologists use this relationship all the time to estimate the percent fat in an animal given its percent water (which is much easier to measure). The data points are split up by species. The species codes are as follows:

1 = guinea pig

2 = rat

3 = baboon

4 = human

5 = horse

6 = rabbit

The data have already been transformed for you. H2O\_ratio is %H20/(100-%H20). Logit\_Pfat is logit(percent fat).

1. Plot your data in their transformed state all in one graph. Label the axes. Use different colors AND symbols for each species. Provide a legend. Tell me about baboons and rabbits.
2. Do the same but in an untransformed state (% fat vs. % water).
3. Rather than have you all run different models, as we discussed in class, I want us all to work on the same model. Run a hierarchical analysis on the slope and intercept (by species), but keep the error variance constant across all species. The hierarchical slides on the website will help you get started with the model file, but you will have to dig for it. We will work more on the code during class on Thursday.
4. Plot the data and posterior function for rabbits. What has the hierarchical analysis provided?
5. Run the model as if you only have the baboon data (linear regression with normal error). Plot the posterior function results with and without the hierarchical method. How do the results differ?