Homework 6
Due Friday, November 1

Think of each question as a "mini-project." This means that everything must be typed, labeled, and referenced, as appropriate. Your answers for each question should discuss the problem, data, model, method, conclusions. For this assignment, you are required to turn in your code.

A famous reliability experiment was performed and $n = 23$ ball bearings were placed on test and the failure times were recorded. The data are recorded in ballbearing.dat. The observations are the number of revolutions, recorded in 10^6 units. (An observation of 100 means 100,000,000 revolutions.) It is well-known that these data have a Weibull failure time. Using Gibbs sampling as your computational tool, fit the ball bearing data. Be very careful in your choice of likelihood (there are at least 3 different ways to write a Weibull sampling distribution). Experts know that ball bearings should average about 50-70 (10^6 revolutions), and that there should absolutely no bearing under 10 (10^6 revolutions). Choose priors that make sense to you. (It is a tough prior specification!) Make sure that your priors agree with the parameter space you determine. After you have your prior specification, fit the model. Report the following:

1. Posterior distributions (joint and marginal), with your priors included on the same plot as your marginals.

2. Posterior summary statistics.

3. The posterior predictive distribution for the next observation.

4. Superior ball bearings will last 120 (10^6 revolutions). Find the posterior probability that our next ball bearing will be a superior ball bearing.

5. Report your final MCMC settings (burn-in, number of samples, candidate density or full conditionals, etc.)