Assignment 2, due date: May 10

STATS 205: Bayesian Data Analysis

1. Download the data "RatWeight.txt" data from Canvas website. Denote the ith observed weight for the jth rat as y_{ij}. Assume $y_{ij} \sim N(\mu_j, \sigma_j^2)$, where

$$
\begin{aligned}
\mu_j &\sim N(\mu_0, \tau_0^2) \\
\sigma_j^2 &\sim \text{Inv-}\chi^2(1, 0.05) \\
\mu_0 &\sim N(0, 1000^2) \\
\tau_0^2 &\sim \text{Inv-}\chi^2(1, 0.05)
\end{aligned}
$$

   Use MCMC to obtain the posterior distributions for all parameters. For each distribution, provide the posterior expectation and 95% interval.

2. Consider the "radon" example discussed in Gelman and Hill (2007). Radon is a carcinogen responsible for several thousand lung cancer deaths per year in the US. The concentration of radon varies in US homes. EPA has started a project to collect radon measurements in a random sample of houses. Use the "radon.csv' data (available on Canvas) to model the distribution of radon in the US. Your model should take the structure of the data into account by assuming the observations within each states are exchangeable and the eight states within the US are also exchangeable.