STAT 532 Assignment 7 -2015
Due: Monday, October 19 (by 4:15 pm)

Show all work **neatly** and **in order** for full credit. Same instructions as previous homeworks...ask if you need clarification.

1. Carefully go through the Flour Beetle tutorial to see an application of the multivariate M-H algorithm. Ask if you have any questions about the set up of the problem. Then, make the following changes to the algorithm.

   (a) (10 pts) Write an independence chain algorithm to fit the model. Use a multivariate normal proposal distribution with mean vector near where the posterior mode should be and a variance-covariance matrix that is approximately twice that of the target distribution. Assess and discuss convergence using plots and summary statistics after running 3 chains from different (and dispersed) starting values. You may also use easily available convergence criteria, but I realize we have not yet discussed them and I don't want you to over-rely on them. Choose (and justify) an appropriate burn-in period before making inference, and include plots for the approximate posterior distributions of μ, σ, and m_1.

   (b) (15 pts) Create an algorithm that samples in turn from each complete conditional distribution using univariate Metropolis (or M-H) steps (a Gibbs algorithm where each complete conditional is sampled with M-H). Use Normal proposal densities with means equal to the current values and you can play around with the variances. Assess and discuss convergence using plots, summary statistics, and convergence criteria after running 3 parallel chains. Choose an appropriate burn-in period before making inference, and include plots for the approximate posterior distributions of μ, σ, and m_1.

   (c) (10 pts) Use JAGS (Just Another Gibbs Sampler) or OpenBUGS to implement a Gibbs sampling approach to fitting the model. Assess and discuss convergence using plots and convergence criteria after running 3 parallel chains. Choose an appropriate burn-in period before making inference, and include plots for the approximate posterior distributions of μ, σ, and m_1.

   (d) (10 pts) Discuss the advantages and disadvantages of the first three algorithms (including the multivariate M-H algorithm in the tutorial as one of the strategies), including efficiency, ease of programming, and transparency. Back up any arguments with plots and summary statistics.