Stat 532 **Name:** _____
In class final
12/04/2017

For questions 1 - 6 choose five of the six questions to answer.

1. (5 points) Describe your personal philosophy for choosing priors.

2. (5 points) Why do we track the acceptance rate in a Metropolis-Hastings algorithm and how does it relate to effective mixing for posterior samples?

3. (5 points) Compare and contrast model selection from a classical and Bayesian perspective.

4. (5 points) A graduate student in ecology asks you, *"My advisor said I need to know MCMC for my thesis. How are Bayesian statistics and MCMC the same or different?"* Answer this question in three or four sentences.

5. (5 points) What are the implications of a non-symmetric proposal distribution in a Metropolis-Hastings sampler? Show mathematically how this changes the acceptance ratio.

6. (5 points) Describe your philosophy for testing in a Bayesian perspective.

7. Assume you are asked to fit a hierarchical Poisson regression model for bike rental counts across a set of stations as a function of temperature and the intercept.

   (a) (8 points) Write out the model, including link functions and all necessary priors.

   (b) (7 points) Sketch out the necessary MCMC to fit this model.