Lab 11
Jennifer Lin

Question 1

Did the chains reach convergence?

Yes, the results of two runs reaches convergence. First, I select the two runs of the trace files. Second, I check the [Marginal Density] distribution curve. The two runs have the same shape of the distribution and have the same peak value. Third, the traces for the two runs are similar to each other as well. Consequently, the two runs converge.

What is the likelihood value for this analysis?

The mean of the likelihood is -1589.1218.

What's the mean posterior estimate of the birth rate and what is the estimated HPD (high posterior density)?

The mean of the birth rate is 0.1612.
The HPD (high posterior density) of the birth rate is [0.1433, 0.1811].

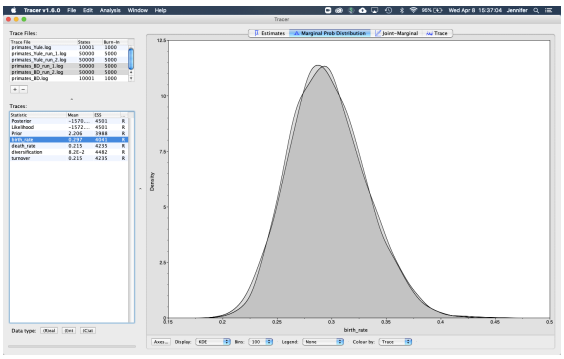
Explain with your words what does HPD tell us?

The HPD tells us the 95% range of the converged value of the parameter. For example, in birth rate, during the mcmc process, there are 95% of the simulation range between [0.1433, 0.1811].

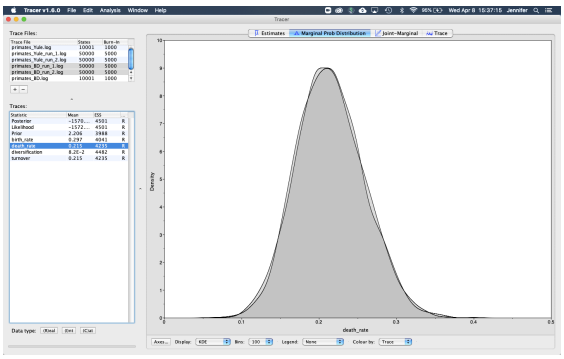
Question 2

A) What are the estimates for speciation rate and extinction rate? Send a screenshot of the Marginal Probability distributions for both parameters (you can select multiple statistics at once in Tracer).

The speciation rate is 0.2963.
The extinction rate is 0.2145.



speciation rate



extinction rate

B) In this exercise we modeled one constant speciation rate and one constant extinction rate. Do you think this a valid model for diversification? How would you like to alter this model to make it more biologically reasonable? Check out tutorials available for RevBayes under the Diversification Rate Estimation subheading: https://revbayes.github.io/tutorials/ Is your altered model described in one of these tutorials?

The speciation rate and extinct rate may not be constant. They may change overtime. It may change because of different environment. In the online tutorial, the model “Environmental-dependent Speciation & Extinction Rates” may be suitable for this alteration. We need give the model of the changing environment data. For example, it can be a vector with value describing the environment.

Question 3

Are the rates state-dependent?

The Speciation rate and Net-Diversification rate are state-dependent since the values for different groups are different, which depend on their own state. As for Extinction rate and Relative Extinction rate, the values for different states are similar to each other (i.e. the distributions overlap a lot). Hence, they are not state-dependent.

What does this tell us about the trait we used in our analysis?

This tells us that maybe we do not need to use two states to simulate the Extinction rate and Relative Extinction rate since the two states in either of the two rates are similar.