Exercise 5. Frameworks for Statistical Analysis
Due date: Oct 3, 2013

Ward & Quinn (1988): egg capsules of the predatory gastropod *Lepsiella vinosa* in different zones of the rocky intertidal shore.

Data set available as *mollusk.txt* on the class website.

Note:
E-mail a single Word document with your results to both Instructors. All analytical work needs to be done in R. Scripts and output from R should be included in the Word document for full credit.

1. Use a parametric analysis of variance (ANOVA) test to determine whether there is a difference in the mean number of eggs per capsule in the littorinid zone versus the mussel zone (Ward and Quinn 1988). Report the appropriate F-ratio and *P*-value from the test (3 points).

2. Use a Monte Carlo randomization test to determine whether there is a difference in the mean number of eggs per capsule in the littorinid zone versus the mussel zone. Specify your test statistic, and use 10,000 iterations to generate the null distribution for the test statistic. Calculate and report the tail probability of the observed value of your test statistic (3 points).

3. Use Bayesian Analysis to calculate what is the probability of a difference in the mean number of eggs per capsule in the littorinid zone versus the mussel zone (create your own numerical hypotheses). Calculate the posterior distribution of the difference and show the probability distributions of the difference, and the means of each habitat (3 points).

4. Discuss the differences in the results between the three approaches, and what were the advantages and disadvantages that you could identify in each of them (1 point).

Ward and Quinn (1988). Journal of Molluscan Studies 54:109-117.