Homework 3 Please answer questions in red for homework. Please hand in only question in red for grading as a doc or docx file.

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Introduction: What happens if populations lack variability? Why did biologists initially expect to find little genetic variability in natural populations?

**Maintaining variability: Many of these concepts are better understood after some background in genetics. I expect you to understand the concepts of gene neutrality, heterozygote advantage and lateral/horizontal inheritance in some detail.**

**For adaptive landscapes, just be able to describe what that model entails. Be also able to define background, hard and soft selection.**

2. a. What is meant by gene neutrality and near-neutrality? b. How does assuming a large number of alleles are neutral help explain the maintenance of allele variation in natural populations?

3. What is a molecular clock? Is any evidence for a molecular clock also evidence for neutrality? What should be the effects of varying generation times on any molecular clock?

4. Adaptive landscapes: a. Describe what the peaks and valleys represent? b. How do genotypes or phenotypes move from one peak to another?

5. a. Define the terms, hard and soft selections. b. How would you globally be able to recognize whether hard or soft selection was working on trait?

6. How does selection maintain variation in the case of the happy face spider?

7. a. How does heterozygote advantage act to maintain variation in a population? b. Be able to associate the heterozygote advantage associated with sickle cell disease. c. How was the advantage of the heterozygote state associated with sickle cell disease discovered? s

8. a. What is horizontal/lateral inheritance of genetic material? How has it and modern practices with regard to antibiotics given rise to super bug MSRA?