Population Genetics
Problem Set 11

1. [Note: This is the corrected format for the first part of **Chapter 10, Question 2**]
Given that $Pr(A_1B_1) = 0.3$, $Pr(A_1B_2) = 0.1$, $Pr(A_2B_1) = 0.2$, $Pr(A_2B_2) = 0.4$

a. Calculate linkage disequilibrium, *D*

b. What is the frequency of the B_2 allele? What is the frequency of the A_1 allele?

2. Give the best definition for the following terms:

a. Quantitative trait:

b. Quantitative trait loci, QTLs:

c. Heritability:

d. LOD score:

e. Tag SNPs:

f. Haplotype blocks:

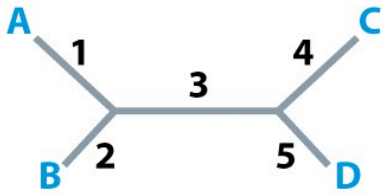
g. Association mapping:

h. Dispersal:

i. Vicariance:

j. Evolutionarily significant units (ESUs):

3. Consider the unrooted tree on the right: How many of the following elements are present on the tree?



How many OTUs?

How many internal branches?

How many external branches?

How many branches total?

How many terminal nodes?

How many internal nodes?

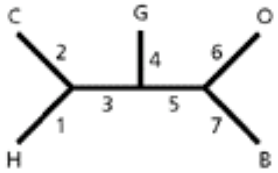
How many nodes total?

If the root were at position **2**, what would be the tree's topology (indicate the root)?

If the root were at position **3**, what would be the tree's topology (indicate the root)?

In terms of their most recent common ancestors, what are the relationship among A, B and C in the tree rooted at position 2; in the tree rooted at position 3, and in the unrooted tree?

4. Consider the unrooted cladogram on the right: How many of the following elements are present on the tree?



How many OTUs?

How many internal branches?

How many external branches?

How many branches total?

How many terminal nodes?

How many internal nodes?

How many nodes total?

If the root were at position **4**, what would be the tree's topology (indicate the root)?

If the root were at position **5**, what would be the tree's topology (indicate the root)?

If in the tree at the top of the page, the letters B, C, G, H and O signify baboon, chimpanzee, gorilla, human and orang-utan, respectively, then what would a rooted tree look like that showed the true relationships among these species?