

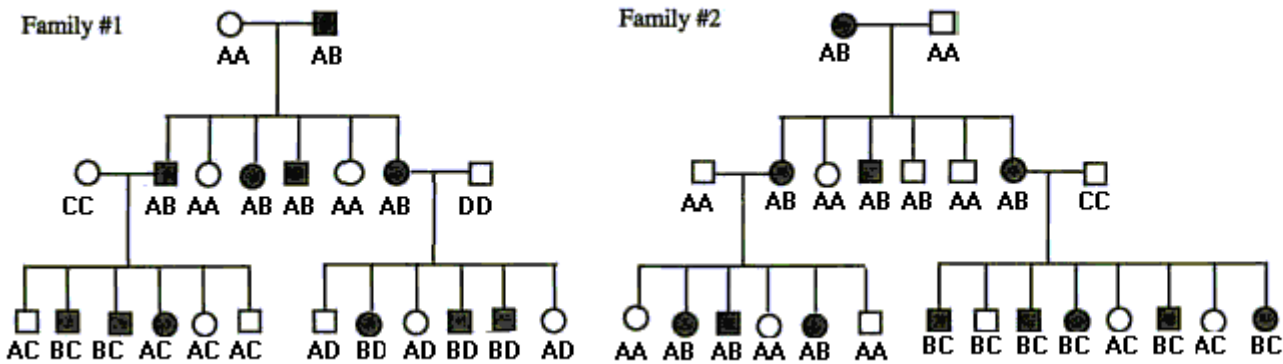
Biology 305 Genetics  
 Problem Set 4

Name \_\_\_\_\_

By printing your name above you acknowledge that while there may have been group discussions of these problems, the work below is yours.

I want to encourage you to work together on these problems, but make sure you understand how to solve each problem on your own. Show all of your work. No credit will be given for answers without work. If a question requires you to determine a genotype show how you obtained it. Please write neatly. If I can't read it, I can't grade it. The homework is due Monday, April 4th before class begins. If it is handed in after class has started there is a 5-point deduction and a further 5 points for each day it is late.

You are studying a dominantly inherited Hobbit syndrome that produces excessively hairy feet. You have begun to examine the segregation of this dominant trait with a microsatellite marker (with alleles A, B, C, D) in the following two human pedigrees. Individuals with the Hobbit mutation are indicated with filled squares and circles. Alleles at the marker locus are indicated by the letters under each individual.



- What does it mean for a marker locus to be informative when looking for linkage in a pedigree?
- How many individuals in Family 1 can be considered in calculating LOD scores?
- How many individuals in Family 2 can be considered in calculating LOD scores?
- Which allele at the marker locus is possibly linked (in phase) with the dominant Hobbit mutation?
- Are any individuals in the pedigrees recombinant? If so, circle them

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Hereditary elliptocytosis is an autosomal dominant anemia in which red blood cells have an abnormal elliptical shape and a shortened life span, which results from the increase destruction of these cells in the spleen. You have two families which are transmitting the trait. You have calculated the following LOD scores in the two families in a linkage analysis between the alleles of the Rh Blood Group locus on chromosome 1 and the elliptocytosis locus.

Recombination Distance ( $\Theta$ )	Family 1 LOD Scores	Family 2 LOD Scores
0.05	4.74	-2.9
0.10	5.44	-2.00
0.15	5.35	-1.73
0.20	4.89	-1.34
0.25	4.2	-1.12
0.30	3.39	-0.91
0.35	2.49	-0.30
0.40	1.54	-0.02
0.50	0	0

- A. What can you conclude about the linkage of the Rh blood locus and the elliptocytosis locus in both families? (Be sure to address whether the two loci are linked and the most probable map distance in both families)

Family one Answer:

Family two Answer:

- B. Propose a genetic explanation for the two different results you have found with these two families