

Homework 1
due January 13, 2017

Do these problems, and email the results (if you can, in a PDF or else in Word .DOC or .DOCX format). Like all of the weekly homeworks this one totals 25 points and is due at the end of that day (at midnight).

1. (12 points) In a population we take a sample of 200 individuals and find these numbers of the genotypes at a 3-allele locus:

A_1A_1	A_1A_2	A_1A_3	A_2A_2	A_2A_3	A_3A_3
10	16	84	6	52	32

- (i) What are the gene frequencies of the alleles in the sample?
- (ii) What genotype frequencies do we expect for the genotypes under random mating at those gene frequencies?
- (iii) Is there an excess of heterozygotes in all heterozygous genotypes? Is there an overall excess of heterozygotes? Is there an excess of homozygotes for all homozygous genotypes?
- (iv) To what extent could these genotype frequencies be explained by having different gene frequencies in the female and the male parents? *Hint: you can do this by just messing about until you figure it out, rather than by algebra.*
2. (13 points) Suppose that at two loci, a large population has two haplotypes, AB and ab (there are initially no Ab or aB haplotypes). The two loci are unlinked, so they segregate independently in any double-heterozygote. The initial haplotype frequencies are 0.6 and 0.4 in both sexes. If it is a random-mating population,
- (i) What are the gene frequencies of the A and the B alleles?
- (ii) What haplotype frequencies do we predict if there is no linkage disequilibrium?
- (iii) What is the value of the linkage disequilibrium parameter D ?
- (iv) What will its value be a generation from now? Will it be zero? Why or why not?