

## HW 2 STAT-GEN

Name: \_\_\_\_\_

(Due Oct 8th in D2L)

### 1) Effect of allele frequency in genetic and additive variance

Using the formulae derived in class (also available in Ch 8 of the book) create plots with total genetic variance and additive variance (vertical axis) versus allele frequency (from 0.01 to 0.99, horizontal axis). Produce one plot for each of the following scenarios (each plot should have two curves, one for total genetic variance and one for additive variance):

a	d
1.0	0.0
1.0	0.5
1.0	1.0

Summarize your conclusions in no more than three sentences.

### 2) Linkage Disequilibrium

Consider two loci (A,B) with two possible alleles at each loci (A/a, B/b). The frequency of allele A is 0.2, the frequency of allele B is 0.3, and the frequency of the AB gamete is 0.1.

2.1) Using this information complete the table below.

Gamete	Expected Frequency (under LE)	Observed Frequency
AB		
Ab		
aB		
ab		

## 2.2) Compute, D, D' and r-squared

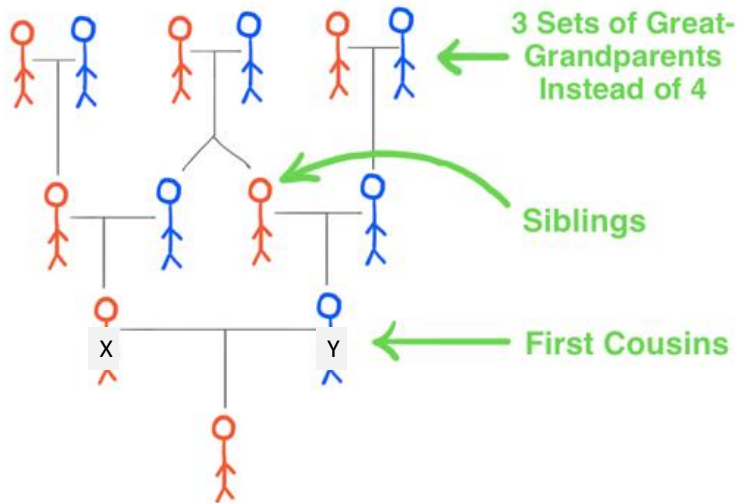
**2.3) Conduct a chi-square test to test H0: locus A and B are in linkage equilibrium, versus Ha: the two loci are in linkage disequilibrium** (report the chi-square statistics, the test-degree-of-freedom, and the p-value, assume n=100)

**2.4) Assuming random mating, computed the expected frequency, of each of the genotypes under HWE and Linkage Equilibrium**

Genotype	Expected Frequency	Genotype	Expected Frequency	Genotype	Expected Frequency
AA BB		Aa BB		aa BB	
AA Bb		Aa Bb		aa Bb	
AA bb		Aa bb		aa bb	

### 3) Compute ancestry and inbreeding for the following cases

#### 3.1) First-cousins

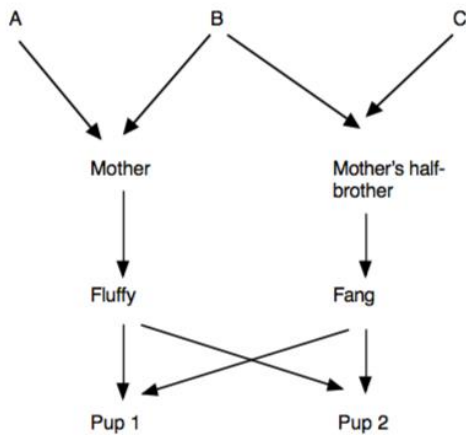


waitbutwhy.com

Coancestry(X,Y): \_\_\_\_\_

- **Q 8.2** A prize bull terrier, Fluffy, is mated to his mother's half-brother's pup, Fang.

Here is the pedigree drawn using a *path diagram*.



Inbreeding Pup 1: \_\_\_\_\_

Inbreeding Pup 2: \_\_\_\_\_

Coancestry(Pup1,Pup2): \_\_\_\_\_