Tutorial 3 – REVISION QUESTIONS

1. We have sequenced allelic variation at a single locus across 191 individuals, finding results as below.

(a) What are the values of allelic diversity, Heterozygosity and effective number of alleles for this locus?
(b) What are the maximum values that you could obtain for the latter two parameters given a locus with 6 alleles?

ALLELE	A1	A2	A3	A4	A5	A6	SUM
Individuals	72	58	31	16	12	2	191

2. If we have a series of loci with the following allele frequencies, what is the value for Polymorphism, P?

Locus	A1	A2	A3	A4	A5
Locus A	0.5	0.2	0.1	0.1	0.1
Locus B	0.5	0.2	0.2	0.05	0.05
Locus C	0.8	0.2	0.1	0	0
Locus D	0.9	0.1	0	0	0
Locus E	0.96	0.04	0	0	0
Locus F	1.0	0	0	0	0

3. Calculate the relative frequencies of each allele in the following sample of genotypes:

Genotype:	A_1A_1	A_1A_2	A_1A_3	A_2A_2	A_2A_3	A_3A_3	TOTAL
Absolute frequency	42	63	42	32	12	6	197

4. Given the Hardy-Weinberg expected frequencies as below, would you say that the distribution of alleles across genotypes deviate significantly from the H-W equilibrium?

Genotype:	A_1A_1	A_1A_2	A_1A_3	A_2A_2	A_2A_3	A_3A_3	TOTAL
Observed	42	63	42	32	12	6	197
Expected	45.33	66.68	31.66	24.52	23.28	5.53	197

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5. We obtained the following genotype frequencies for 80 individuals. What is the value of linkage disequilibrium (D) for this sample? Would you conclude that there is linkage between alleles at these two loci?

	A_1B_1	A_1B_2	A_2B_1	A_2B_2	
Relative frequency	**0.220**	**0.300**	**0.400**	**0.080**	1.000

6. Let's say we instead got the following genotype frequencies. What is the value of linkage disequilibrium (D) now?

	A_1B_1	A_1B_2	A_2B_1	A_2B_2	
Relative frequency	**0.300**	**0.220**	**0.080**	**0.400**	1.000

7. What frequencies of genotypes which would give close to the maximal value of D?

	A_1B_1	A_1B_2	A_2B_1	A_2B_2	
Relative frequency					1.000