

- 1) I did a survey of allozyme variation in a large population of armadillos. The genotype counts at three loci are shown below. Calculate the allele frequencies and the observed and expected genotype frequencies for all loci. Are these loci in Hardy-Weinberg Genotypic Frequency equilibrium? If not, which ones are not and how do they deviate? Is it a significant deviation at an alpha of 0.01 (hint: use a χ^2 . You use all categories [i.e., sum over all genotypes] and the degrees of freedom are number of genotypes minus 1)? Please show your work.

Genotype	Locus 1	Locus 2	Locus 3
AA	275	23	275
AB	498	865	130
BB	227	112	77
AC	0	0	200
CB	0	0	58
CC	0	0	260
Total	1000	1000	1000

- 2) Assuming Hardy-Weinberg conditions with random mating of genotypes I showed in class that the genotype frequency of AA in the offspring generation was equal to that in the parental generation (i.e., $U' = p^2 = U$). Recreate (without looking at your notes or overhead #3.1B) the mating table that I used. Prove that $V' = 2pq$ and that $W' = q^2$. Show that the frequency of p in the offspring generation is equal to that in the parental generation.
- 3) In class, I showed that for sex linked genes following Hardy-Weinberg rules the genotype frequency of AA in the offspring generation females was $U' = p_f p_m$. Again, without using your notes of overheads, recreate the mating table (i.e., OH 3.3) that I used (without the errors please). Prove that $V' = p_f q_m + p_m q_f$ and that $W' = q_f q_m$. Show that the frequency of p in the offspring generation females (p_f') is equal to $1/2(p_f + p_m)$.
- 4) For a sex linked gene with two alleles (A and a). If the allele frequency in the parental generation is 0.3 in females and 0.8 in males, what are the allele and genotype frequencies in each sex in the (show your work):
- next generation for each sex? Are the genotype frequencies in HWE?
 - third generation for each sex? Are the genotype frequencies in HWE?
 - when the allele frequencies are equal in each sex? Are the genotype frequencies in HWE?