**Hardy Weinberg Problem Set 2016**

**SHOW EVERY SINGLE STEP OF YOUR WORK!!!**

1. In fruit flies, the allele for normal length wing is dominant over the allele for vestigial wings. In a population of 1000 individuals, 312 show the recessive phenotype.
   1. How many individuals would you expect to be homozygous dominant for the trait?
   2. How many individuals would you expect to be homozygous dominant for the trait?
2. The allele for unattached ear lobes is dominant over the allele for attached earlobes. In a population of 500 individuals, 25% show the recessive phenotype.
   1. How many individuals would you expect to be homozygous dominant?
   2. How many individuals would you expect to be heterozygous?
3. The allele for the hair pattern called widow’s peak is dominant over the allele for no widow’s peak. In a population of 1000 individuals, 320 show the dominant phenotype. How many individuals would you expect of each of the three possible genotypes for this trait?
4. In certain African countries 2.5% of the newborn babies have sickle cell anemia, which is a recessive trait. Out of a random population of 1000 newborn babies, how many would you expect of each of the three possible genotypes for this trait?
5. In a population, the dominant phenotype of a certain trait occurs 81% of the time. What is the frequency of the dominant allele?
6. After graduation, you and 22 friends build a raft, sail to a deserted island and start a new population, totally isolated from the world. Two of your friends carry (that is, are heterozygous for) the recessive cf allele, which in homozygotes causes cystic fibrosis.
   1. Assuming that the frequency of this allele does not change as the population grows, what will be the instance of cystic fibrosis on your island (i.e. after one generation of random mating, how many individuals would you expect to have cf)?
   2. Cystic fibrosis births on the island is how many times greater than the original mainland. The frequency of births on the mainland is .043%.
7. If 5.3% of an African population is born with a severe form of sickle cell anemia (ss), what percentage of the population will be more resistant to malaria because they are heterozygous (Ss) for the sickle cell gene?
8. Among a group of Australian aborigines, the following blood types were determined for the M-N blood group:

M = 24

MN = 214

N = 487

This group has three blood types (phenotypes), M, N and MN, which are caused by a single locus with two codominant alleles, LM and LN. Individuals homozygous for LM are blood type M; homozygotes for LN are blood type N; heterozygotes express both alleles and are blood type MN.

A. Using these data, calculate the frequency of the LM and LN alleles in this population.

B. What is the term used to describe the situation when there are two alleles producing three distinct genotypes?

1. A form of albinism results from being homozygous for a recessive allele b. On average, 9,999 out of every 10,000 people in a certain country are normal pigmented, but 1 in 10,000 have the albino phenotype. How many of the 1 million inhabitants of this country are expected to be carriers of the allele for albinism (i.e., to be Bb heterozyotes)? Assume the population is in Hardy-Weinberg equilibrium.