

1. The Basque people have no I^B alleles in their population and the percent of the i allele in the population is 25.5. If the population is in Hardy-Weinberg equilibrium what are the blood types and frequencies in the population?

2. In a breed of cattle, most of the cattle are black but brown calves are born at a rate of about 1 in 25. In the interest of breed purity farmers have decided that they want all the cows to be black. If brown (recessive) calves are always removed from the population and not bred, would you expect to see any born in two generations? If so, at what rate?

3. M and N are human blood group proteins that are co-dominant. An individual can have blood type M, N or MN. Two tropical islands (D - Dystopia and E - Eutopia) have the following numbers of people of each blood group:

	M	N	MN
D	2,450	2,100	450
E	3,200	1,000	800

a) What are the allele frequencies for the M and N alleles in

Dystopia

Eutopia

b) One of these islands has recently had a lot of people immigrate to it from Scranton Pennsylvania. Which island do you think it is and why?

4. This question was on the quiz, and in general, the class did not do well on it. Solving it requires an understanding of basic Mendelian genetics and sex linkage. I am putting it here as a 2nd chance for you to hone your skills. Remember that sex is determined by whether an individual gets an X or a Y from their father. It is easiest to solve this using fractions, thinking about one gene at a time and multiplying the likelihoods later.

In cats the autosomal recessive dilute modifier (d) changes black to gray, and orange to cream.

White patches are caused by the incompletely dominant autosomal white spotting factor S. SS cats are called vans, which is mostly white with a few spots of color on their head and body and a colored tail. Ss cats are about 50% white and are called bicolors, ss cats have no white.

Orange (O) is sex-linked and effected by X inactivation. Heterozygous female cats (Oo) have patches of orange and black, or blue and cream, and are called calicos when they also have white.

A blue cream calico cat (ddOoSs) mates with a black and white bicolor tomcat who carries dilute (DdoYSs).

a) What is the likelihood for a kitten to be a black and white van?

b) What is the likelihood for a kitten to be a cream and white bicolor?

c) Are either of the colors above restricted to only one sex in this case?