

1. How is the random mating (HW) model used in evaluating whether recessive genetic diseases are maintained by a balance of selection versus mutation? What does this assume? Do you think these assumptions are reasonable?
2. Some genetic diseases are much more common than predicted from the mutation-selection balance model (eg, Cystic Fibrosis). What is the explanation in the case of Cystic Fibrosis? Do you think it is correct to call the CF allele a deleterious allele?
3. There are two populations of a species, pop1 and pop2. Migrants move from pop1 to pop2, but not vice versa. For a locus with two alleles  $A$  and  $a$ , in generation 1, the frequency of  $A$  is 0.5 in pop1 and 0.75 in pop2; in generation 2 it is 0.5 in pop1 and 0.625 in pop2.
  - a. What is the rate of migration, measured as the chance that a migrant allele is a first generation immigrant (assume the absence of any other evolutionary forces)?
  - b. If the rate of migration is the same in the next generation, what is the frequency of  $A$  in generation 3?