HOMEWORK SET #4

Due: Thursday, December 8

1. Assume that a locus is segregating in a population with allelic frequencies 0.9 (for *A*) and 0.1 (for *a*) and that the fitnesses of the genotypes *AA*, *Aa*, and *aa* are 1.0, 1.0, and 0.8, respectively.

   (a) What is the segregation load?
   (b) What is the load due to inbreeding for offspring of full-sib matings ($f = ¼$)?
   (c) What is the load due to inbreeding for offspring of half-sib matings ($f = 1/8$)?
   (d) What is the load due to inbreeding for offspring of first-cousin matings ($f = 1/16$)?

2. Nielsen & Slatkin, p. 149 #7.4

3. Nielsen & Slatkin, p. 175, #8.1

4. Nielsen & Slatkin, p. 175, #8.2

5. Nielsen & Slatkin, p. 175, #8.3

6. Consider the continent-island model with alleles *A* and *a*. Assume all immigrant alleles are *a* (i.e., $p_c = 0$), that the rate of gene flow $m = 0.02$, and that *a* is deleterious recessive on the island.

   If the frequency of *A* on the island is initially $p = 0.8$, compute p', the frequency at the beginning of the next generation assuming the selection coefficient is…
   (a) $s = 0.01$
   (b) $s = 0.05$

   Compute the equilibrium frequency of the *A* allele on the island assuming…
   (c) $s = 0.01$
   (d) $s = 0.05$