

1. What is the effective size of a herd of 10 dairy cows and one bull? What is it for 40 cows and 1 bull? For 10 cows and 2 bulls? What about for X-linked genes in these 3 cases?
2. Construct the transition probability matrix when
  - a.  $N=2$
  - b.  $N=3$ .
3. Calculate the number of females  $N_f$  that maximizes the effective size of a population assuming that  $N_e = \frac{4N_f N_m}{N_f + N_m}$ .
4. For a x-linked locus find the number of males ( $N_m$ ) that maximizes the effective population size ( $N_e = \frac{9N_f N_m}{2N_f + 4N_m}$ ).
5. Show that the effective population size for an x-linked gene is equal to  $N_e = \frac{9N_f N_m}{2N_f + 4N_m}$  following the approach shown in tutorial.