1. What is the effective size of an otherwise ideal diploid population in which the distribution of successful gametes per individual has a mean of two and a variance of 4?

2. A population of cats has 4 males and 30 females.
   a. A neutral allele in this population has frequency 0.45. What is the probability that this allele is ultimately lost from the population?
   b. The genetic variance at this locus is $2(0.45)(0.55) = 0.495$ in the starting generation. What is the genetic variance expected to be after 7 generations?
   c. How could we keep the cats such that there was as much variance as possible after 7 generations?

3. It was planned to keep a mouse stock with 8 pair-matings per generation and minimal inbreeding. The plan, however could not be strictly adhered to because some pairs fail to provide the two offspring required. In one particular generation the 8 matings provided the following numbers of offspring that were used as parents: 0, 1, 1, 2, 2, 3, 3, 4. What was the effective population size in this generation?

4. If the population of mice in problem 4 were maintained exactly as planned, what fraction of its genetic variance would have been lost after 5 generations? How much would have been lost of the mice had a Poisson distribution of reproductive success, with mean =2?