1. Chapter 1, pages 16-20
   Basic: 1.1, 1.2, 1.3, 1.4, 1.6, 1.8, 1.9, 1.10
   More Challenging: 1.7, 1.12, 1.13*, 1.14*, 1.15, 1.16, 1.17a*, 1.18*
   Problems with * should be attempted after lecture 2.

2. (Advanced.) Using the appropriate expansions, verify that the sum of
   the geometric probabilities, the sum of the binomial probabilities, and
   the sum of the Poisson probabilities all add to 1.

3. If \( (n_1, \ldots, n_k) \) have independent Poisson distributions with mean pa-
   rameters \( (\mu_1, \ldots, \mu_k) \) respectively, then show that given \( n = \sum_{j=1}^{k} n_j \)
   the distribution of \( (n_1, \ldots, n_k) \) is multinomial. Also find the parame-
   ters of this multinomial distribution.

4. (Advanced.) Show that for fixed \( 0 < \pi_o < 1 \), the function,

   \[
   \Lambda(p) = \left(\frac{\pi_o}{p}\right)^{np} \left(\frac{1 - \pi_o}{1 - p}\right)^{n(1-p)}, \quad 0 \leq p \leq 1,
   \]

   is increasing for \( p > \pi \) and decreasing for \( p \leq \pi \).