

**Homework 4**

**Due: Thursday, October 25th at beginning of class.**

1. Exercise 1.76 in text.
2. Exercise 1.77 in text.
3. Consider the following variation of the branching process. At each time  $n$ , each individual produces offspring independently using offspring distribution  $\{p_k\}$ , and then the individual dies with probability  $q \in (0, 1)$ . Hence, each individual reproduces  $j$  times where  $j$  is the lifetime of the individual. For which values of  $q$ ,  $\{p_k\}$  do we have eventual extinction with a probability of one? (Hint: the answer is quite “clean,” at the end it should relate a common statistic of  $\{p_k\}$  to  $q$ . Be clear and show your work.)
4. Exercise 2.2.
5. Exercise 2.22.
6. Exercise 2.24.
7. Exercise 2.25.