Selected Problems from Pitman's "Probability" Text

Statistics 200A, Nathan Ross, Fall 2011

1.r.4

There are two boxes.

Box 1 contains 2 red balls and 3 black balls.

Box 2 contains 8 red balls and 12 black balls.

One of the two boxes is picked at random, and then a ball is picked at random from the box.

1. Are the events describing the color of the ball independent of the events stating which box is chosen?
2. What if there were 10 black balls rather than 12 in Box 2, but the other numbers were the same?

3.4.15

Suppose F has geometric distribution on $\{0, 1, 2, \ldots\}$. Show that for every $k \geq 0$,

$$P(F - k = m | F \geq k) = P(F = m), \quad m = 0, 1, \ldots$$

Additional Problem

Let T be a finite or countable set of the real numbers, say T equals $\{x_1, x_2, \ldots, x_n\}$ or $\{x_1, x_2, \ldots\}$, and let f be a function defined on T such that

1. $f(x_i) \geq 0$,
2. $\sum_i f(x_i) = 1$.

Define a random variable on a probability space having probability function f.