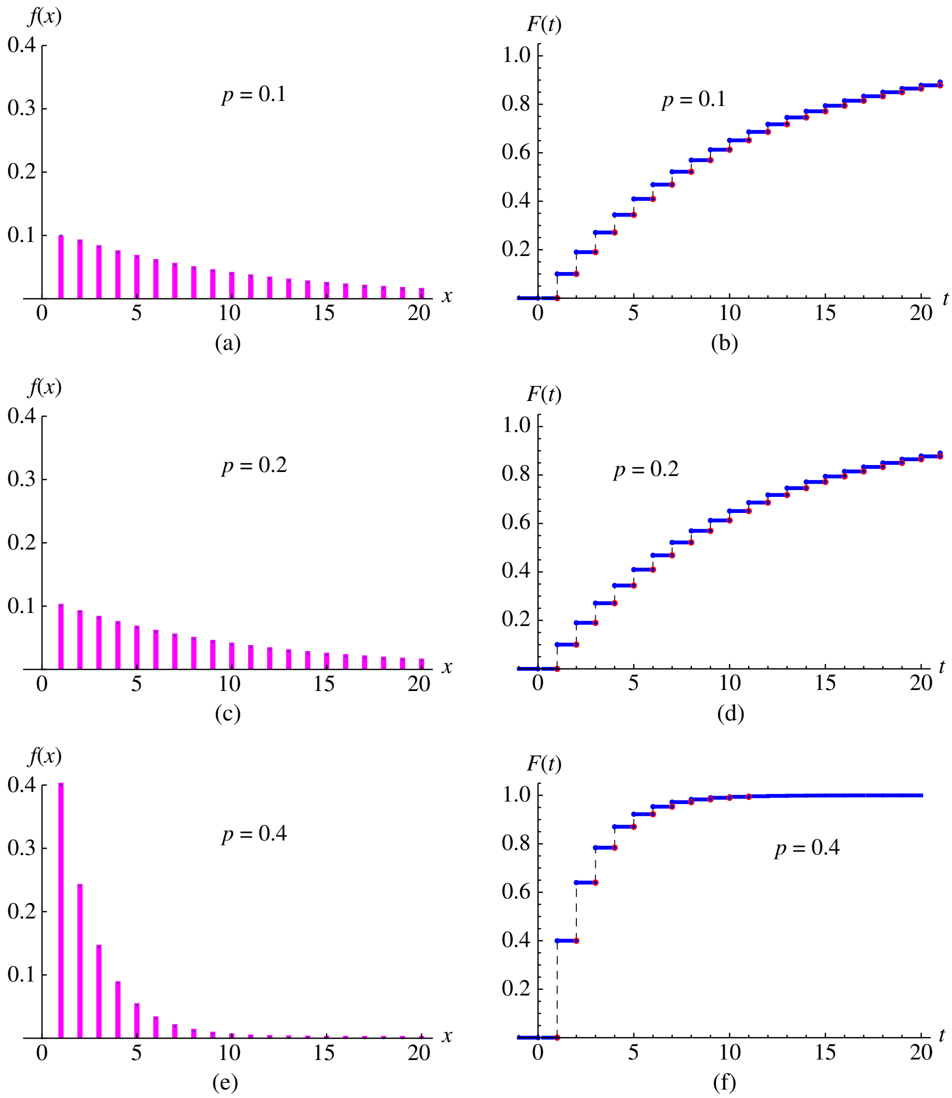

Figure 5.4 The probability function (left) and the cumulative distribution function (right) of the geometric distribution for various choices of p.

But the intersection of the events $\{X > n + k\}$ and $\{X > n\}$ is simply $\{X > n + k\}$, and by an appeal to (5.5) we get that

$$P(X > n + k | X > n) = \frac{P(X > n + k)}{P(X > n)} = \frac{q^{n+k}}{q^n} = q^k = P(X > k).$$

We now turn our attention to the mean and variance for a geometric random variable.

Proposition 5.4 *If the random variable X has the geometric distribution with parameter p, then*

$$\mu = E(X) = \frac{1}{p}, \quad \sigma^2 = \text{Var}(X) = \frac{q}{p^2}.$$