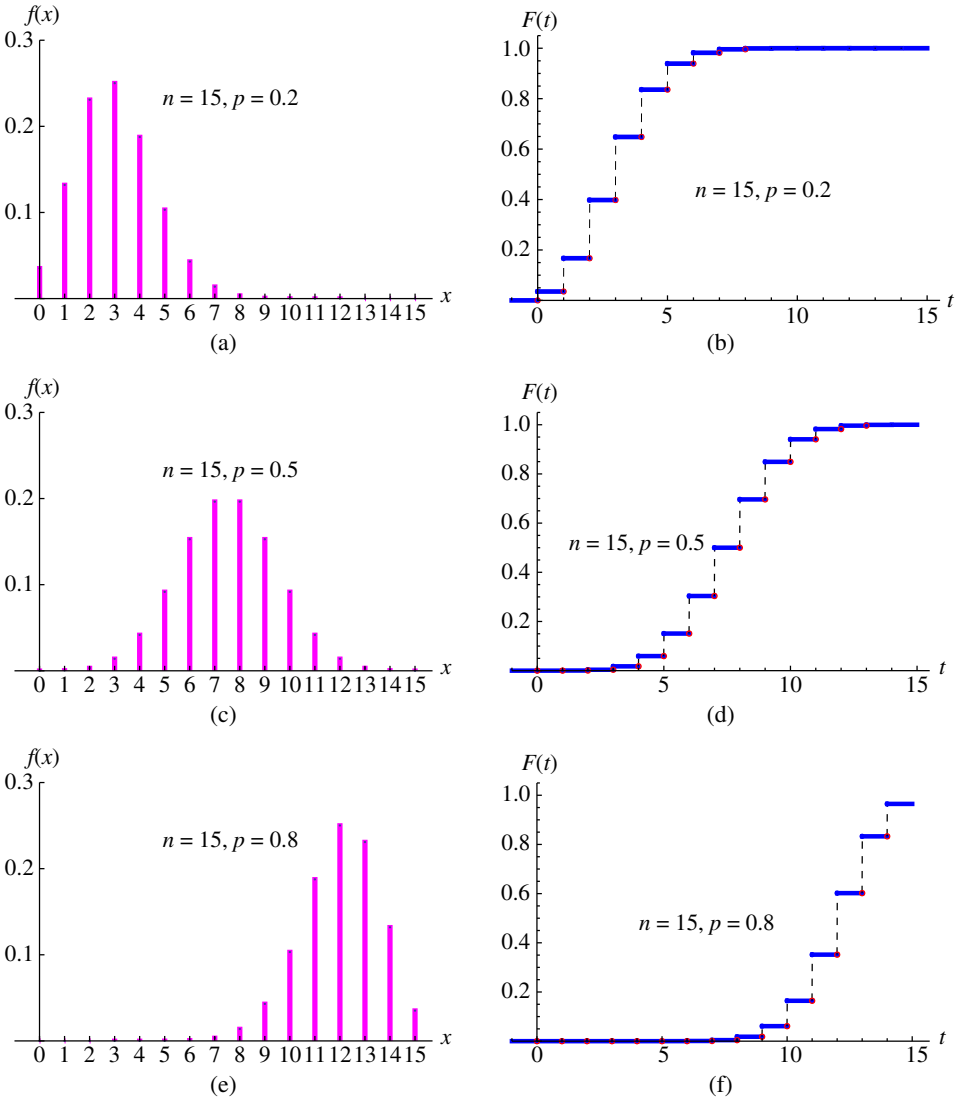

Figure 5.3 The probability function (left) and the cumulative distribution function (right) of the binomial distribution for various choices of n and p.

Figure 5.3 displays the probability function and the cumulative distribution function for a random variable X that follows the binomial distribution $b(n, p)$, for several values of the parameters n and p.

We now calculate the mean and variance of the binomial distribution. First, we recall the following two formulas from Chapter 2:

$$\sum_{x=0}^{n} x \binom{n}{x} p^x q^{n-x} = np, \quad \sum_{x=0}^{n} x(x-1) \binom{n}{x} p^x q^{n-x} = n(n-1)p^2.$$