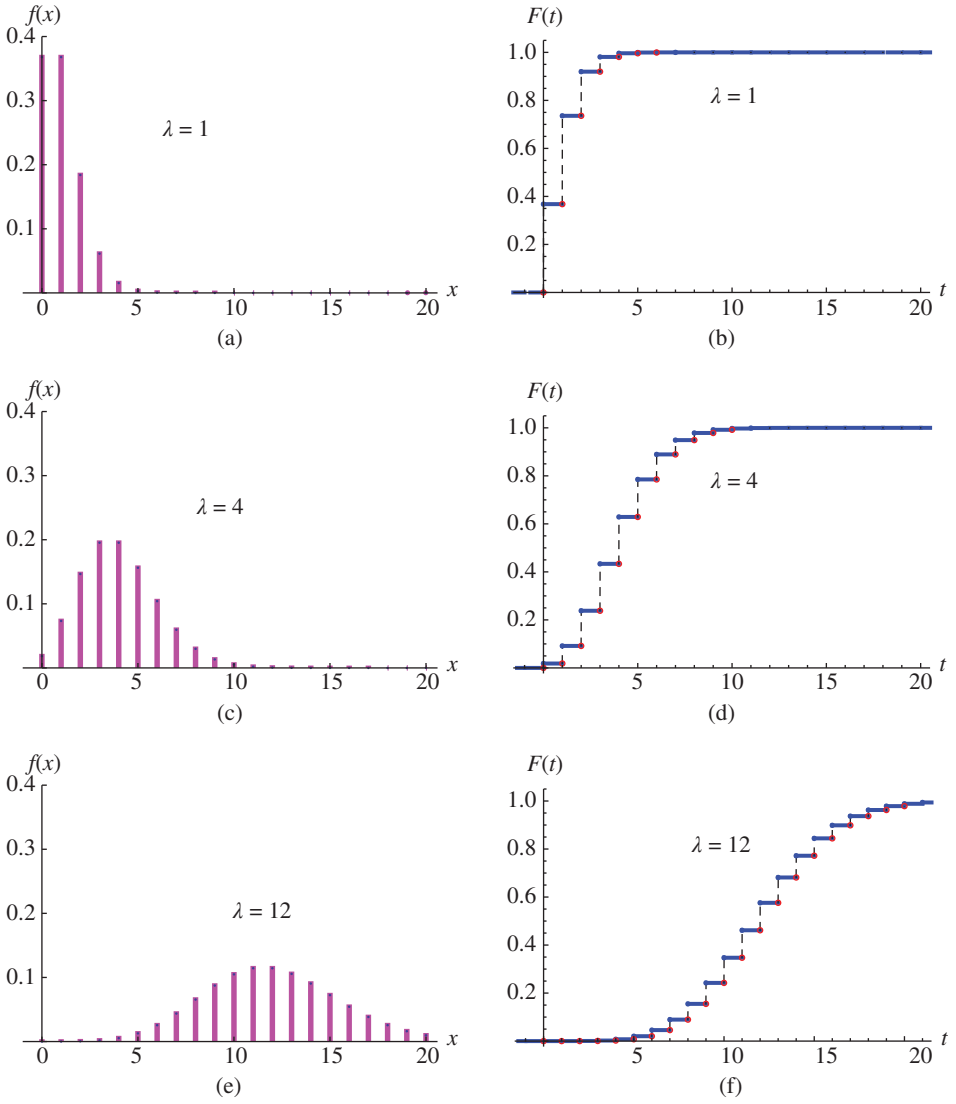

Figure 5.8 The probability function (left) and the cumulative distribution function (right) of the Poisson distribution for various choices of λ.

SOLUTION We assume that the involvement of any two different cars in an accident constitutes a pair of independent events. Then the cars passing through the spot may be thought of as a sequence of Bernoulli trials, each with success probability $p = 0.0001$ (note that in this way we regard a car accident as a "success"!). Then, the total number of accidents over the weekend, say X, has a binomial distribution with $n = 4500$ and $p = 0.0001$. Thus, for $x = 0, 1, 2, \ldots, 4500$,

$$P(X = x) = \binom{4500}{x} (0.0001)^x (0.9999)^{n-x}.$$