1 If a single dice is rolled, determine the probability of each of the following events:

a. Obtaining the number 5.
b. Obtaining an even number.
c. Obtaining a number *greater* than 2.

2 If two dice are rolled, determine the probability of each of the following events:

a. Obtaining a sum of 2.
b. Obtaining a sum of 7.
c. Obtaining an even sum.

3 The thief of Bagdad has been placed in a prison which has three doors. One of the doors leads him on a one-day trip, after which he is dumped on his head (which destroys his memory as to which door he chose). Another door is similar except he takes a three-day trip before being dumped on his head. The third door leads to freedom. Assume he chooses a door immediately and with probability 1/3 when he has a chance. Find his expected number of days to freedom. (Hint: use conditional expectation.)

4 R is a random variable that is equally likely to be any value between 80 and 100.

a. Find $P(90 \le R \le 95)$.
b. Find $P(90 \le R \le 95 \mid 85 \le R \le 95)$.

5 The joint density function of two random variables is

$$f_{X,Y}(x, y) = e^{-x}e^{-y}, \quad x \ge 0, y \ge 0,$$
$$= 0, \quad \text{elsewhere.}$$

a. Find the marginal density function of X. (Give the answer for all values of the random variable.)
b. Find the marginal distribution function of Y. (Give the answer for all values of the random variable.)

6 Compute the mean and variance of the random variable X when

a $p_X(0) = \frac{1}{3}, p_X(2) = \frac{2}{3}$

b $p_X(x) = \dfrac{1}{x}, \quad x = 6, 3, 2,$
$= 0, \quad$ elsewhere.

c $p_X(x) = \binom{6}{x}\left(\frac{2}{3}\right)^x\left(\frac{1}{3}\right)^{6-x} \quad x = 0, 1, 2, \ldots, 6,$
$= 0, \quad$ elsewhere.

d $f_X(x) = 2x, \quad 0 \le x \le 1,$
$= 0, \quad$ elsewhere.

e $f_X(x) = x, \quad 0 \le x \le 1,$
$= 2 - x, \quad 1 \le x \le 2,$
$= 0, \quad$ elsewhere.

f $F_X(x) = 0, \quad x < 0,$
$= x^{1/2}, \quad 0 \le x \le 1,$
$= 1, \quad x > 1.$

g $F_X(x) = 0, \quad x < 0,$
$= 1 - e^{-x/\lambda}, \quad x \ge 0.$

7 If $f_{X,Y}$ is uniform in the region shown in Figure P5-1 that is,

$$f_{X,Y}(x, y) = \tfrac{1}{2}, \quad 0 \le x \le 1, 0 \le y \le 1,$$
$$= \tfrac{1}{2}, \quad -1 \le x \le 0, -1 \le y \le 0,$$
$$= 0, \quad \text{elsewhere,}$$

find $E[XY]$ and ρ.

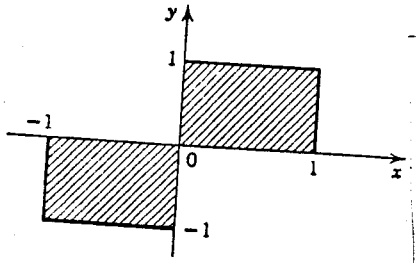

Figure P5-1