(1) Check whether or not each of $p_1(x)$, $p_2(x)$ is a legitimate probability mass function.

x	$p_1(x)$
0	0.3
1	0.3
2	0.5
3	-0.1

x	$p_2(x)$
0	0.1
1	0.4
2	0.4
3	0.1

(2) Consider the experiment of tossing a coin twice.
    a. List the experimental outcomes.
    b. Define a random variable that represents the number of heads occurring on the two tosses.
    c. Show what value the random variable would assume for each of the experimental outcomes.
    d. Is this random variable discrete or continuous?

(3) Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. What are the possible values of X?
    If the coin is assumed fair, for $n = 3$, what are the probabilities associated with the values that X can take on?

(4) A metal fabricating plant currently has five major pieces under contract each with a deadline for completion. Let X be the number of pieces completed by their deadlines, and suppose its p.m.f. $p(x)$ is given by

x	$p(x)$
0	0.05
1	0.10
2	0.15
3	0.25
4	0.35
5	0.10

    a. Find and plot the c.d.f. of X.
    b. Use the c.d.f. to find the probability that between one and four pieces, inclusive, are completed by their deadline.

(5) Consider the experiment of a worker assembling a product.
    a. Define a random variable that represents the time in minutes required to assemble the product.
    b. What values may the random variable assume?
    c. Is the random variable discrete or continuous?

(6) The probability distribution for the random variable x follows.
    a. Is this probability distribution valid? Explain.
    b. What is the probability that $x = 30$?
    c. What is the probability that x is less than or equal to 25?
    d. What is the probability that x is greater than 30?

x	p(x)
20	.20
25	.15
30	.25
35	.40

(7) The distribution function of the random variable X is given

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{2} & 0 \le x < 1 \\ \frac{2}{3} & 1 \le x < 2 \\ \frac{11}{12} & 2 \le x < 3 \\ 1 & 3 \le x \end{cases}$$

   (a) Plot this distribution function.
   (b) What is $P(X > \frac{1}{2})$?
   (c) What is $P(2 < X \le 4)$?
   (d) What is $P(X < 3)$?
   (e) What is $P(X = 3)$?

(8) A technician services mailing machines at companies in the Reno area. Depending on the type of malfunction, the service call can take $1, 2, 3,$ or 4 hours. The different types of malfunctions occur at about the same frequency.

   a. Develop a probability distribution for the duration of a service call.
   b. Draw a graph of the probability distribution.
   c. Show that your probability distribution satisfies the conditions required for a discrete probability function.
   d. What is the probability a service call will take 3 hours?
   e. A service call has just come in, but the type of malfunction is unknown. It is 3:00 p.m. and service technicians usually get off at 5:00 p.m. What is the probability the service technician will have to work overtime to fix the machine today?

(9) A simple random sample of size $n = 3$ is drawn from a batch of ten product items. If three of the 10 items are defective, find the p.m.f. and the c.d.f. of the random variable X = {number of defective items in the sample}.

(10) In NBA Final, the winner is the first team to get four victories. Suppose Boston Celtic will play with Team C for the final. For each game, Boston has 60% winning chance.

   (a) What is the probability that Boston wins the championship within 5 games?
   (b) What is the probability that Boston wins the championship using 7 games? (Win 3 of the first 6 games and win the 7th game)

(11) There are 100 marbles in a box: 60 red, 40 other colors.

   (a) Choose 5 with replacement, find P(two red).
   (b) Choose 5 without replacement, find P(two red).

(12) Toss 10 fair 6-sided dice. What is the probability that at least two 6's appeared?