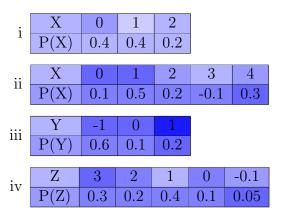
## EXERCISE 13.4

1. State which of the following are not the probability distributions of a random variable. Give reasons for your answer



- 2. An urn contains 5 red and 2 black balls. Two balls are randomly drawn. Let X represent the number of black balls. What are the possible values of X? Is X a random variable?
- 3. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed 6 times. What are possible values of X?
- 4. Find the probability distribution of
  - i number of heads in two tosses of a coin.
  - ii number of tails in the simultaneous tosses of three coins.
  - iii number of heads in four tosses of a coin.
- 5. Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as
  - i number greater than 4

ii six appears on at least one die

- 6. From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs.
- 7. A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.
- 8. A random variable X has the following probability distribution

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	$k^2$	$2k^2$	$7k^2+k$

Determine

ii 
$$P(X < 3)$$

iii 
$$P(X > 6)$$

iv 
$$P(0 < X < 3)$$

9. The random variable X has a probability distribution P(X) of the following form, where k is some number :

$$P(x) = \begin{cases} k, & \text{if } x = 0\\ 2k, & \text{if } x = 1\\ 3k, & \text{if } x = 2\\ 0, & otherwise \end{cases}$$

a Determine the value of k.

b Find P (X < 2), P (X 
$$\leq$$
 2), P(X  $\geq$  2)

- 10. Find the mean number of heads in three tosses of a fair coin.
- 11. Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.

- 12. Two numbers are selected at random (without replacement) from the first six positive integers. Let X denote the larger of the two numbers obtained. Find E(X).
- 13. Let X denote the sum of the numbers obtained when two fair dice are rolled. Find the variance and standard deviation of X.
- 14. A class has 15 students whose ages are 14, 17, 15, 14, 21, 17, 19, 20, 16, 18, 20, 17, 16, 19 and 20 years. One student is selected in such a manner that each has the same chance of being chosen and the age X of the selected student is recorded. What is the probability distribution of the random variable X? Find mean, variance and standard deviation of X.
- 15. In a meeting, 70A member is selected at random and we take X = 0 if he opposed, and X = 1 if he is in favour. Find E(X) and Var(X).

Choose the correct answer in each of the following:

- 16. The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is
  - a 1
  - b 2
  - c 5
  - $d \frac{8}{3}$
- 17. Suppose that two cards are drawn at random from a deck of cards. Let X be the number of aces obtained. Then the value of E(X) is
  - A  $\frac{37}{221}$
  - B  $\frac{5}{13}$
  - $C \frac{1}{13}$
  - $D_{\frac{2}{13}}$