

EXERCISE 23A

1 Classify the following random variables as continuous or discrete:

- a the quantity of fat in a sausage
- b the mark out of 50 for a geography test
- c the weight of a seventeen year old student
- d the volume of water in a cup of coffee
- e the number of trout in a lake
- f the number of hairs on a cat
- g the length of hairs on a horse
- h the height of a sky-scraper.



2 For each of the following:

- i identify the random variable being considered
- ii give possible values for the random variable
- iii indicate whether the variable is continuous or discrete.

- a To measure the rainfall over a 24-hour period in Singapore, the height of water collected in a rain gauge (up to 400 mm) is used.
 - b To investigate the stopping distance for a tyre with a new tread pattern, a braking experiment is carried out.
 - c To check the reliability of a new type of light switch, switches are repeatedly turned off and on until they fail.
- 3 A supermarket has four checkouts A, B, C, and D. Management checks the weighing devices at each checkout. If a weighing device is accurate a Y is recorded; otherwise, N is recorded. The random variable being considered is the number of weighing devices which are accurate.
- a Suppose X is the random variable. What values can X have?
 - b Tabulate the possible outcomes and the corresponding values for X .
 - c Describe, using X , the events of:
 - i exactly two devices being accurate
 - ii at least two devices being accurate.

4 Consider tossing three coins simultaneously. The random variable under consideration is the number of heads that could result.

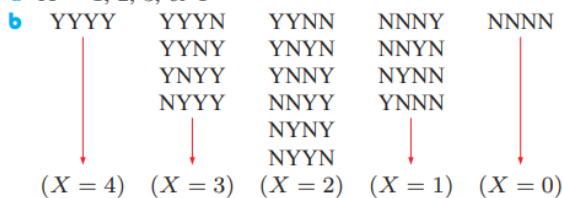
- a List the possible values of X .
- b Tabulate the possible outcomes and the corresponding values of X .
- c Find the values of $P(X = x)$, the probability of each x value occurring.
- d Graph the probability distribution $P(X = x)$ against x as a probability column graph.

EXERCISE 23A

- 1 a continuous b discrete c continuous d continuous
 e discrete f discrete g continuous h continuous

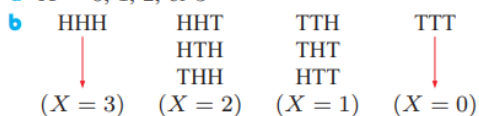
- 2 a i $X =$ the height of water in the rain gauge
 ii $0 \leq X \leq 400$ mm iii continuous
 b i $X =$ stopping distance ii $0 \leq X \leq 50$ m
 iii continuous
 c i number of switches until failure
 ii any integer ≥ 1 iii discrete

- 3 a $X = 1, 2, 3,$ or 4



- c i $X = 2$ ii $X = 2, 3,$ or 4

- 4 a $X = 0, 1, 2,$ or 3



- c $P(X = 3) = \frac{1}{8}$
 $P(X = 2) = \frac{3}{8}$
 $P(X = 1) = \frac{3}{8}$
 $P(X = 0) = \frac{1}{8}$

