

Self-assessment: 18 Probability distributions

1. The random variable X has distribution shown in the table below:

x	1	3	4	6	7
$P(X = x)$	p	$\frac{1}{5}$	$\frac{1}{10}$	$2p$	$\frac{2}{5}$

- Find the value of p .
- Find $P(X \geq 4)$.
- Find the expected value of X .

(accessible to students on the path to grade 3 or 4) [8 marks]

2. The amount of coffee dispensed by a machine follows normal distribution with mean 150 ml and standard deviation 5 ml.

- Calculate the probability that the machine dispenses less than 142 ml of coffee.
- Find the value of a if 20% of cups contain more than a ml of coffee.

(accessible to students on the path to grade 3 or 4) [5 marks]

3. A die is biased so that the probability of rolling a six is 0.12. The die is rolled seven times.

- Find the probability that no sixes are rolled.
- Find the expected number of sixes.
- Find the variance of the number of sixes.
- Find the probability that more than four sixes are rolled.

(accessible to students on the path to grade 5 or 6) [9 marks]

4. Random variable X follows binomial distribution $B(6, p)$ and $P(X = 4) = 0.261$.

- Find the possible values of p .
- For the maximum value from (a), find $P(X \leq 2)$.
- For the maximum value from (a), find $E(X)$ and $\text{Var}(X)$.

(accessible to students on the path to grade 7) [8 marks]