

6A Discrete Random Variables (DRVs)

1. Three fair coins are tossed.
 - a) Write down all the possible outcomes when the three coins are tossed.

A random variable, X , is defined as the number of heads when the three coins are tossed.

- b) Write the probability distribution of X as:
 - i) A table

 - ii) A probability mass function

2. A biased four sided dice with faces numbered 1, 2, 3 and 4 is rolled. The number on the bottom face is modelled as a random variable x .

Given that $P(X = x) = \frac{k}{x}$

- a) Find the value of k

- b) Give the probability distribution of X in table form.

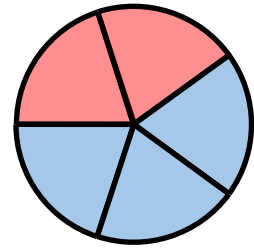
- c) Find the Probability that:

i) $X > 2$

ii) $1 < X < 4$

iii) $X > 4$

3. The spinner below is spun until it lands on red, or has been spun 4 times in total. Find the probability distribution of the random variable S , the number of times the spinner is spun.



6B The Binomial Distribution

1. Gary is playing chess against Nigel, and has a $\frac{2}{3}$ chance of winning each game.

a) If they play 5 games, what is the probability of Gary winning exactly 3?

b) Find the term containing x^3 in the following expansion:

$$(x + y)^5$$

c) If the probability of Gary winning a chess match is $\frac{2}{3}$, find the probability of him winning exactly 3 games out of 5

d) Give the probability distribution of X in table form.

Notes:

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2. Gary is playing chess against Nigel, and has a $\frac{2}{3}$ chance of winning each game. If they play 5 games, what is the probability of Gary winning exactly 3?

3. The random variable $X \sim B\left(12, \frac{1}{6}\right)$. Find:

a) $P(X = 2)$

b) $P(X = 9)$

c) $P(X \leq 1)$

4. The probability that a randomly chosen member of a reading group is left-handed is 0.15. A random sample of 20 members of the group is taken.
- a) Suggest a suitable model for the random variable X , the number of members in the sample who are left handed. Justify your choice.
- b) Use your model to calculate the probability that:
- i) Exactly 7 sample members are left handed
- ii) Less than two members are left-handed

6C Cumulative Probabilities on The Binomial Distribution

1. The random variable $X \sim B(20, 0.4)$. Find:

a) $P(X \leq 7)$

b) $P(X < 6)$

c) $P(X \geq 15)$

2. A spinner is designed so that the probability it lands on red is 0.3. Jane has 12 spins. Find the probability that Jane obtains:

a) No more than 2 reds

b) At least 5 reds

3. Jane decides to use this spinner for a class competition. She wants the probability of winning a prize to be less than 0.05. Each member of the class has 12 spins and the number of reds is recorded.

Find how many reds should be needed to win a prize