

Topic Y5 Probability and proof (Post-TT) [40]

1.

Jenny and John are each allowed two attempts to pass an examination.

(i) Jenny estimates that her chances of success are as follows.

- The probability that she will pass on her first attempt is $\frac{2}{3}$.
- If she fails on her first attempt, the probability that she will pass on her second attempt is $\frac{3}{4}$.

Calculate the probability that Jenny will pass. [3]

(ii) John estimates that his chances of success are as follows.

- The probability that he will pass on his first attempt is $\frac{2}{3}$.
- Overall, the probability that he will pass is $\frac{5}{6}$.

Calculate the probability that if John fails on his first attempt, he will pass on his second attempt. [3]

(Total 6 marks)

2.

A bag contains 5 black discs and 3 red discs. A disc is selected at random from the bag. If it is red it is replaced in the bag. If it is black, it is not replaced. A second disc is now selected at random from the bag.

Find the probability that

- (i) the second disc is black, given that the first disc was black, [1]
- (ii) the second disc is black, [3]
- (iii) the two discs are of different colours. [3]

(Total 7 marks)

3.

Prove by contradiction that there is no greatest even positive integer. [3]

(Total 3 marks)

4.

A washing-up bowl contains 6 spoons, 5 forks and 3 knives. Three of these 14 items are removed at random, without replacement. Find the probability that

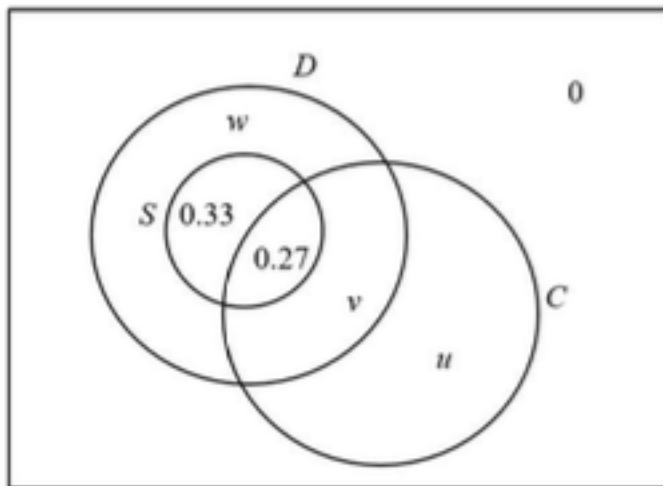
- (i) all three items are of different kinds, [3]
- (ii) all three items are of the same kind. [3]

(Total 6 marks)

5.

The Venn diagram shows the probabilities of students' lunch boxes containing a drink, sandwiches and a chocolate bar.

D is the event that a lunch box contains a drink,
 S is the event that a lunch box contains sandwiches,
 C is the event that a lunch box contains a chocolate bar,
 u , v and w are probabilities.



(a) Write down $P(S \cap D')$ (1)

One day, 80 students each bring in a lunch box.
Given that all 80 lunch boxes contain sandwiches and a drink,

(b) estimate how many of these 80 lunch boxes will contain a chocolate bar. (3)

Given that the events S and C are independent and that $P(D|C) = \frac{14}{15}$

(c) calculate the value of u , the value of v and the value of w . (7)

(Total 11 marks)

6.

A game uses an unbiased die with faces numbered 1 to 6. The die is thrown once. If it shows 4 or 5 or 6 then this number is the final score. If it shows 1 or 2 or 3 then the die is thrown again and the final score is the sum of the numbers shown on the two throws.

(i) Find the probability that the final score is 4. [3]

(ii) Given that the die is thrown only once, find the probability that the final score is 4. [1]

(iii) Given that the die is thrown twice, find the probability that the final score is 4. [3]

(Total 7 marks)