

Probability

Question 1

- (a) An unbiased 6 sided die is tossed once and the result recorded. Write down the probability of obtaining:
- (i) a 5 (ii) not a 5 (iii) an even number (iv) a number greater than 4.
- (b) It is then tossed a second time. What is the probability that the two throws of the die produce:
- (i) the same number (ii) two fives (iii) no fives (iv) at least one 5?

Question 2

- (a) Three tetrahedral dice are rolled together. What is the probability of obtaining a triple-two?
- (b) Hence find the probability of failing to obtain a triple-two in a single roll of three dice.
- (c) Find the probability of failing to obtain any triple-twos in ten rolls of three tetrahedral dice.
- (d) Hence find the probability of obtaining at least one triple-two in ten rolls of three tetrahedral dice.

Question 3

- (a) A standard pack of 52 playing cards, without jokers, is shuffled and the first card is then turned face up. What is the probability that the first card is:
- (i) a heart
(ii) a red card
(iii) a 10
(iv) the 10 of hearts?
- (b) The procedure is carried out twice and the result is recorded for each turn. What is the probability that:
- (i) the two cards are both the 10 of hearts
(ii) exactly one card is the 10 of hearts
(iii) neither card is the ten of hearts
(iv) at least one card is the 10 of hearts?
- (c) What would the answers to (b) above be if the cards had only been shuffled once and then the top two cards had been turned over?

Question 4

Nicholas Bernoulli suggested that the births of boys and girls could be modelled by rolling a die with 35 faces, 18 of which represent a boy and 17 represent a girl.

- (a) What is the probability that the two children of a family will be:
- (i) both boys
(ii) one of each sex?
- (b) What is the probability that the four children of a family will:
- (i) be all boys
(ii) contain at least one boy?

Question 5

Pete, Nick and Ian each choose at random an integer between 1 and 10. What is the probability that:

- (a) They all choose different numbers?
(b) At least two of them choose the same number?
(c) They all choose the same number?
(d) Exactly two of them choose the same number?
(e) Nick's chosen number is greater than Ian's chosen number?

Answers
1(a)(i) 1/6 (ii) 5/6 (iii) 1/2 (iv) 1/3 (b)(i) 1/36 (ii) 25/36 (iii) 25/36 (iv) 11/36 2(a) 1/64 (b) 63/64 (c) 0.8543 (d) 0.1457
3(a)(i) 1/4 (ii) 1/2 (iii) 1/13 (iv) 1/52 3(b)(i) 1/2704 (ii) 0.0377 (iii) 0.9619 (iv) 0.0381 3(c)(i) 0 (ii) 1/26 (iii) 25/26
4(a)(i) 0.2645 (ii) 0.4996 (b)(i) 0.0700 (ii) 0.9443 5(a) 72/100 (b) 28/100 (c) 1/100 (d) 27/100 (e) 9/20