

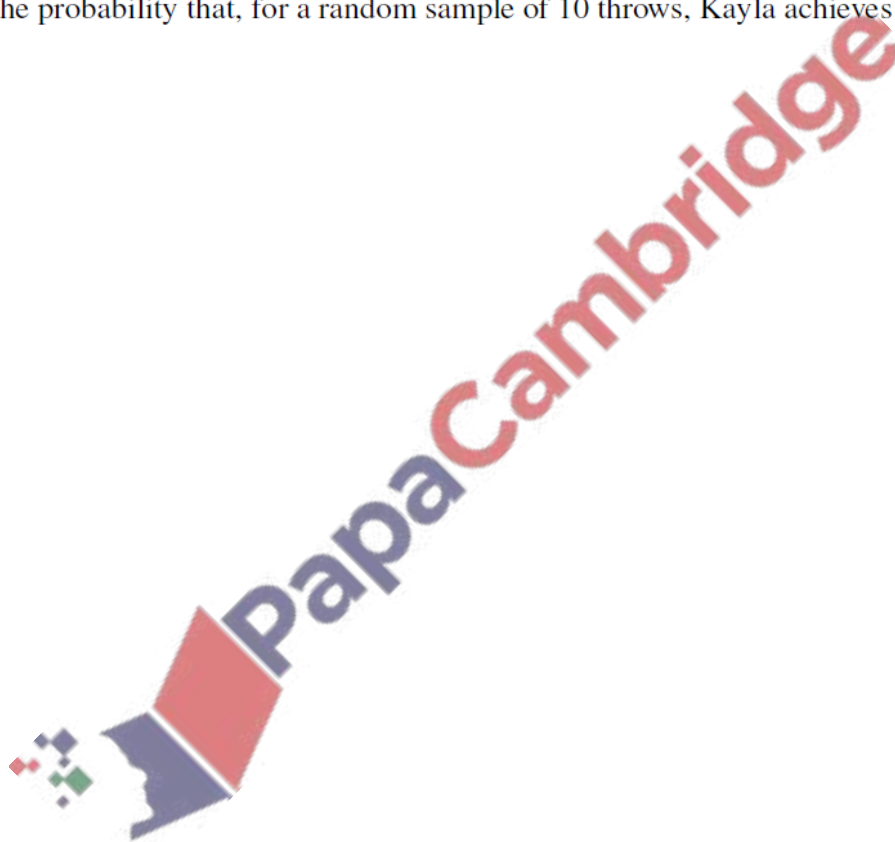
Binomial Distribution and geometric distribution – 2020 AS

1. Nov/2020/Paper_9709/51/No.3

Kayla is competing in a throwing event. A throw is counted as a success if the distance achieved is greater than 30 metres. The probability that Kayla will achieve a success on any throw is 0.25.

(a) Find the probability that Kayla takes more than 6 throws to achieve a success. [2]

(b) Find the probability that, for a random sample of 10 throws, Kayla achieves at least 3 successes. [3]



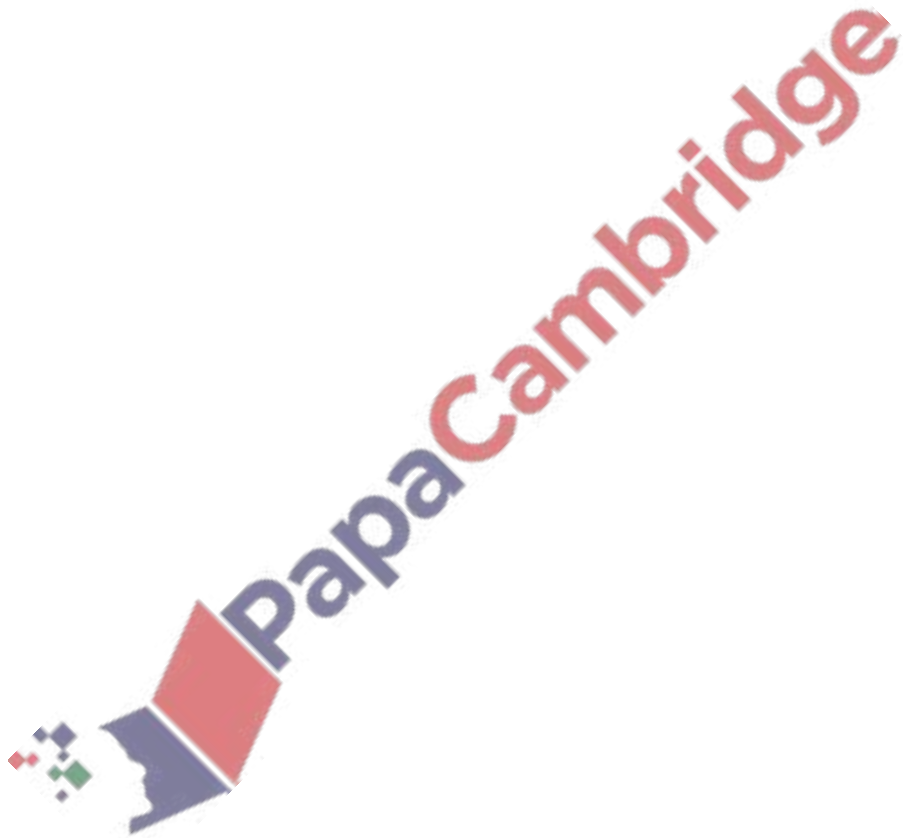
2. Nov/2020/Paper_9709/52/No.1

A fair six-sided die, with faces marked 1, 2, 3, 4, 5, 6, is thrown repeatedly until a 4 is obtained.

(a) Find the probability that obtaining a 4 requires fewer than 6 throws. [2]

On another occasion, the die is thrown 10 times.

(b) Find the probability that a 4 is obtained at least 3 times. [3]



3. Nov/2020/Paper_9709/53/No.2

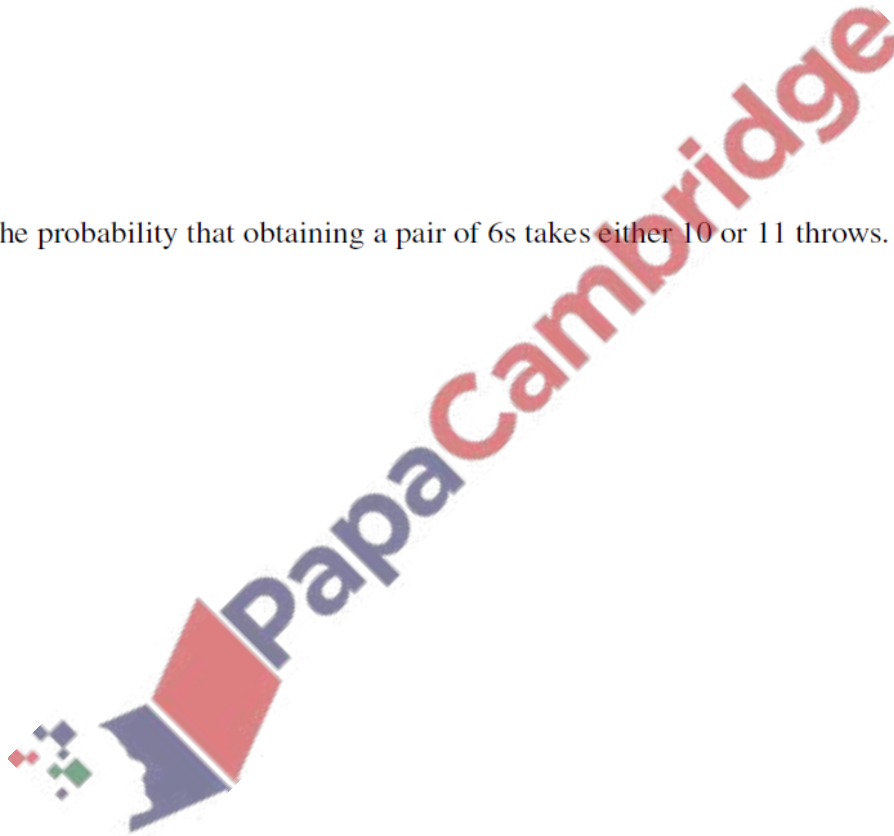
An ordinary fair die is thrown until a 6 is obtained.

- (a) Find the probability that obtaining a 6 takes more than 8 throws. [2]

Two ordinary fair dice are thrown together until a pair of 6s is obtained. The number of throws taken is denoted by the random variable X .

- (b) Find the expected value of X . [1]

- (c) Find the probability that obtaining a pair of 6s takes either 10 or 11 throws. [2]



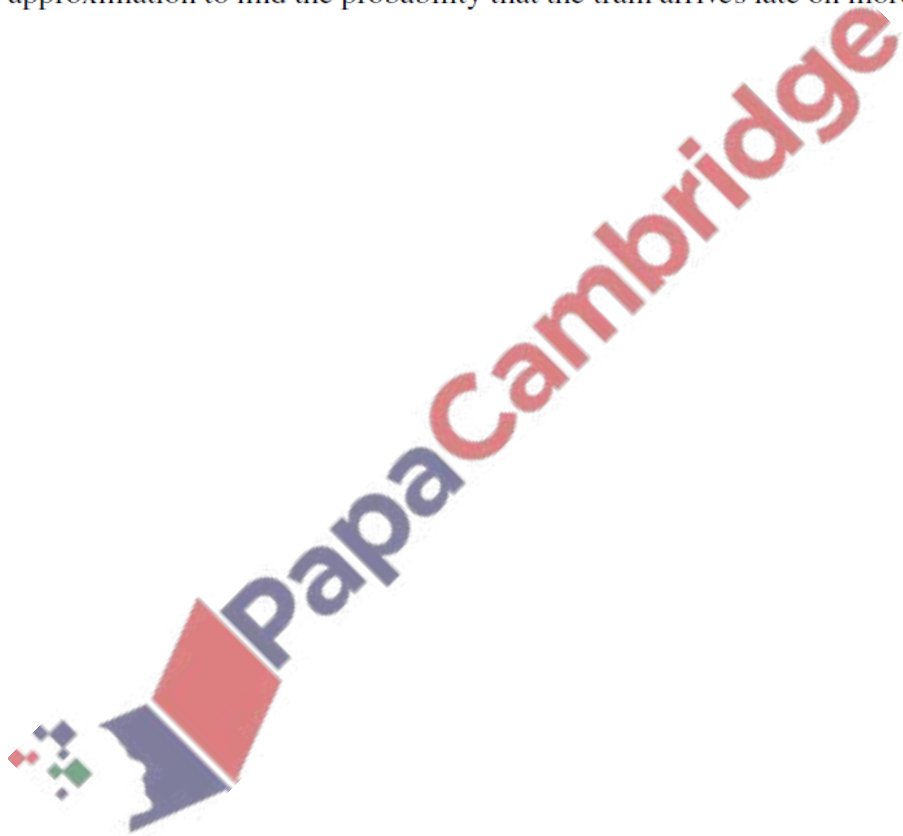
4. Nov/2020/Paper_9709/53/No.4

The 13 00 train from Jahor to Keman runs every day. The probability that the train arrives late in Keman is 0.35.

- (a) For a random sample of 7 days, find the probability that the train arrives late on fewer than 3 days. [3]

A random sample of 142 days is taken.

- (b) Use an approximation to find the probability that the train arrives late on more than 40 days. [5]



5. June/2020/Paper_9709/51/No.1

The score when two fair six-sided dice are thrown is the sum of the two numbers on the upper faces.

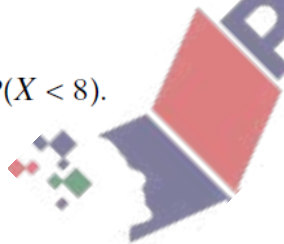
- (a) Show that the probability that the score is 4 is $\frac{1}{12}$. [1]

The two dice are thrown repeatedly until a score of 4 is obtained. The number of throws taken is denoted by the random variable X .

- (b) Find the mean of X . [1]

- (c) Find the probability that a score of 4 is first obtained on the 6th throw. [1]

- (d) Find $P(X < 8)$. [2]



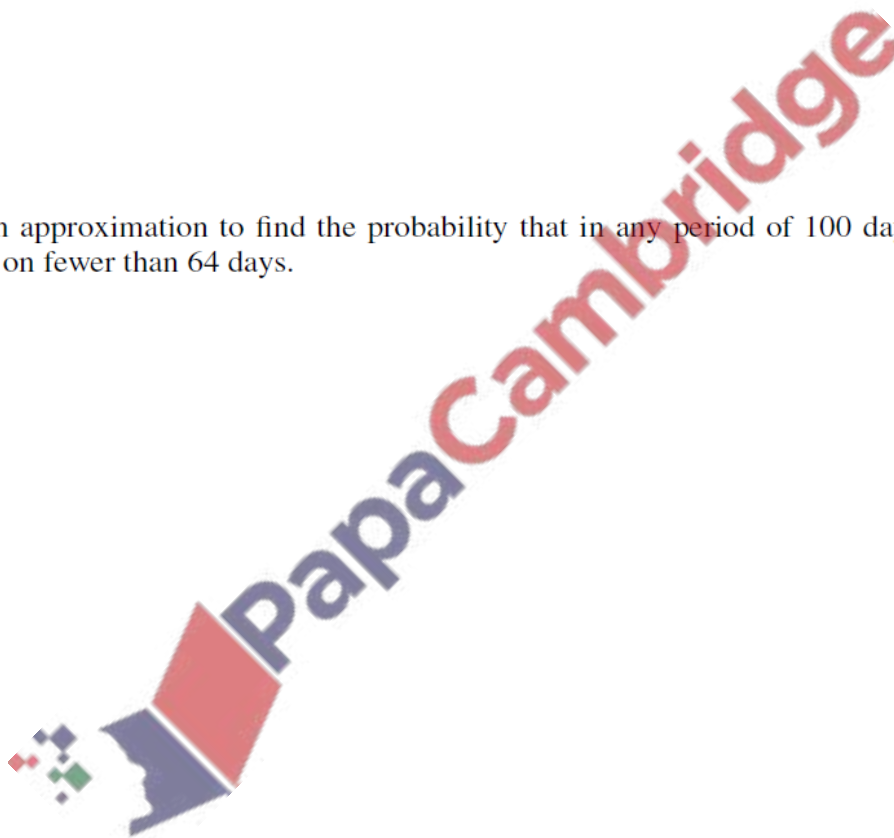
6. June/2020/Paper_9709/52/No.7

On any given day, the probability that Moena messages her friend Pasha is 0.72.

- (a) Find the probability that for a random sample of 12 days Moena messages Pasha on no more than 9 days. [3]

- (b) Moena messages Pasha on 1 January. Find the probability that the next day on which she messages Pasha is 5 January. [1]

- (c) Use an approximation to find the probability that in any period of 100 days Moena messages Pasha on fewer than 64 days. [5]

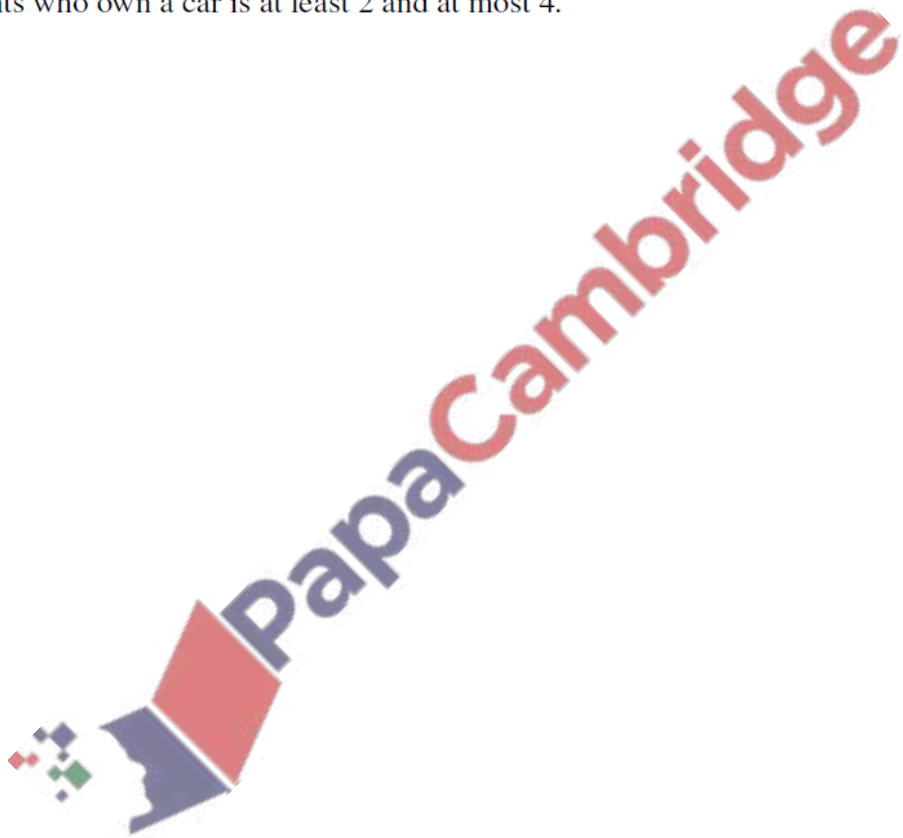


7. June/2020/Paper_9709/53/No.2

In a certain large college, 22% of students own a car.

- (a) 3 students from the college are chosen at random. Find the probability that all 3 students own a car. [1]

- (b) 16 students from the college are chosen at random. Find the probability that the number of these students who own a car is at least 2 and at most 4. [3]



8. June/2020/Paper_9709/53/No.5

A pair of fair coins is thrown repeatedly until a pair of tails is obtained. The random variable X denotes the number of throws required to obtain a pair of tails.

(a) Find the expected value of X . [1]

(b) Find the probability that exactly 3 throws are required to obtain a pair of tails. [1]

(c) Find the probability that fewer than 6 throws are required to obtain a pair of tails. [2]

On a different occasion, a pair of fair coins is thrown 80 times.

(d) Use an approximation to find the probability that a pair of tails is obtained more than 25 times. [5]

9. March/2020/Paper_9709/52/No.2

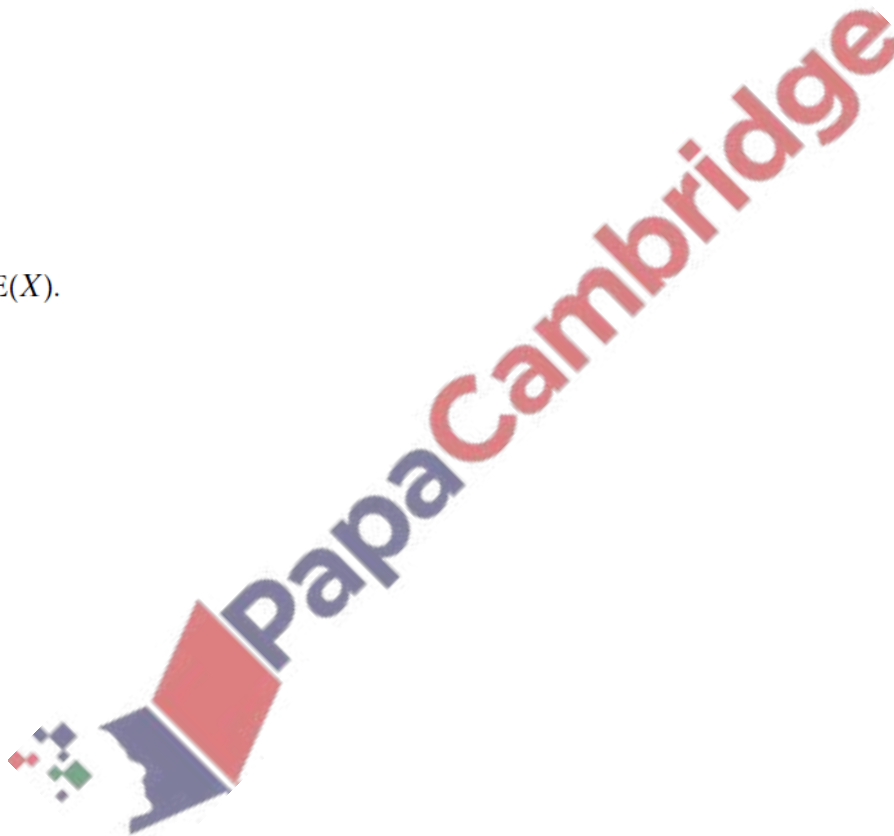
An ordinary fair die is thrown repeatedly until a 1 or a 6 is obtained.

- (a) Find the probability that it takes at least 3 throws but no more than 5 throws to obtain a 1 or a 6. [3]

On another occasion, this die is thrown 3 times. The random variable X is the number of times that a 1 or a 6 is obtained.

- (b) Draw up the probability distribution table for X . [3]

- (c) Find $E(X)$. [2]



10. March/2020/Paper_9709/52/No.5

In Greenton, 70% of the adults own a car. A random sample of 8 adults from Greenton is chosen.

- (a) Find the probability that the number of adults in this sample who own a car is less than 6. [3]

A random sample of 120 adults from Greenton is now chosen.

- (b) Use an approximation to find the probability that more than 75 of them own a car. [5]

