Binomial Distribution – 2023 June AS Math 9709

1. June/2023/Paper_9709/51/No.7

A children's wildlife magazine is published every Monday. For the next 12 weeks it will include a model animal as a free gift. There are five different models: tiger, leopard, rhinoceros, elephant and buffalo, each with the same probability of being included in the magazine.

Sahim buys one copy of the magazine every Monday.

(a) Find the probability that the first time that the free gift is an elephant is before the 6th Monday. [2]

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(b) Find the probability that Sahim will get more than two leopards in the 12 magazines. [3]

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(c) Find the probability that after 5 weeks Sahim has exactly one of each animal. [3]

2. June/2023/Paper_9709/52/No.4

A fair 5-sided spinner has sides labelled 1, 2, 3, 4, 5. The spinner is spun repeatedly until a 2 is obtained on the side on which the spinner lands. The random variable X denotes the number of spins required.

(a) Find $P(X = 4)$. [1]

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(b) Find $P(X < 6)$. [2]

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Two fair 5-sided spinners, each with sides labelled 1, 2, 3, 4, 5, are spun at the same time. If the numbers obtained are equal, the score is 0. Otherwise, the score is the higher number minus the lower number.

(c) Find the probability that the score is greater than 0 given that the score is **not** equal to 2. [3]

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The two spinners are spun at the same time repeatedly .

(d) For 9 randomly chosen spins of the two spinners, find the probability that the score is greater than 2 on at least 3 occasions. [3]

3. June/2023/Paper_9709/53/No.1

Two fair coins are thrown at the same time repeatedly until a pair of heads is obtained. The number of throws taken is denoted by the random variable X.

(a) State the value of $E(X)$. [1]

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(b) Find the probability that exactly 5 throws are required to obtain a pair of heads. [1]

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(c) Find the probability that fewer than 7 throws are required to obtain a pair of heads. [2]

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