Week 4 Questions   ST3009: Statistical Methods for Computer Science

For each problem, explain/justify how you obtained your answer in order to obtain full credit. In fact, most of the credit for each problem will be given for the derivation/model used as opposed to the final answer.

Question 1. Consider an experiment where we roll two 6-sided dice. Let random variable Y be the sum of the values rolled. The sample space is $\{(1,1),(1,2),(1,3),\ldots,(6,6)\}$ and recall that a random event is a subset of the sample space.

(a) What random event corresponds to $Y = 2$?

(b) What event corresponds to $Y = 3$?

(c) What event corresponds to $Y = 4$?

(d) Now let X be the indicator random variable associated with the event $\{(1,1),(2,2),(3,3)\}$. What is the probabilities that $X = 1$? 0.083

Question 2. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed 3 times.

(a) What are the possible values of X ?

(b) What is $P(X = -3)$? 0.1250

(c) What is $P(X = -1)$? 0.3750

(d) If the coin is assumed fair, calculate the PMF and CDF of X and plot a sketch of both.

Question 3. Four 6-sided dice are rolled. The dice are fair, so each one has equal probability of producing a value in $\{1, 2, 3, 4, 5, 6\}$. Let $X =$ the minimum of the four values rolled. (It is fine if more than one of the dice has the minimal value.)

(a) What is $P(X \geq 1)$? 1

(b) What is $P(X \geq 2)$? 0.4823

(b) What is the CDF of X i.e. $P(X \leq k)$ for all values of k ?