

TRINITY COLLEGE DUBLIN
School of Computer Science and Statistics

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 $\{(1, 1), (1, 2), (1, 3), \dots, (6, 6)\}$ 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 $X = 1$?

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 $P(X = -3)$?
- (c) What is $P(X = -1)$?
- (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 $P(X \geq 1)$?
- (b) What is $P(X \geq 2)$?
- (b) What is the CDF of X i.e. $P(X \geq k)$ for all values of k ?