Indian Institute of Information Technology, Vadodara (IIITV)
IIITV- International Campus Diu

Probability and Statistics (MA201)

TUTORIAL 2

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1. An urn contains two black balls and three white balls. Two balls are selected at random from the urn without replacement and the sequence of colors is noted.
   (a) Find the probability that both balls are black.
   (b) Find the probability that the second ball is white.

2. A ball is selected from an urn containing two black balls, numbered 1 and 2, and two white balls, numbered 3 and 4. Let the events A, B, and C be defined as follows:

$$A = \{(1,b),(2,b)\}, \text{"black ball selected"};$$
$$B = \{(2,b),(4,w)\}, \text{"even-numbered ball selected"};$$
$$C = \{(3,w),(4,w)\}, \text{"number of ball is greater than 2 . "}$$

   Are events A and B independent? Are events A and C independent?

3. One of two coins is selected at random and tossed three times. The first coin comes up heads with probability p_1 and the second coin with probability $p_2 = \frac{2}{3} > p_1 = \frac{1}{3}$.
   (a) What is the probability that the number of heads is k?
   (b) Find the probability that coin 1 was tossed given that k heads were observed, for $k = 0, 1, 2, 3$
   (c) In part (b), which coin is more probable when k heads have been observed?

4. A die is tossed and the random variable X is defined as the number of full pairs of dots in the face showing up. Draw the Probability Mass Function (PMF) of X.

5. Let X be the maximum of the number of heads obtained when two fair coin tossed twice.
   (a) Draw the PMF of X.
   (b) If second coin has probability of heads 3/4. Draw the PMF of X.

6. Two dice are tossed and we let X be the absolute difference in the number of dots facing up.
   (a) Find and plot the PMF of X.
   (b) Find the probability that $X \leq k$ for all k.

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Best wishes