



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E - CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU



UNIT II TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions –Marginal and conditional distributions – Covariance – Correlation and Regression without equations

Joint Distributions

Puzzle 1:

Two friends, Asha and Ravi, each roll a die. The outcome of Asha's die is X , and Ravi's is Y .

- List all possible pairs (X, Y) that can occur.
- If you want to know the probability that Asha rolls a 3 and Ravi rolls a 5, what kind of probability are you looking for?

Puzzle 2:

In a card game, you draw one card from each of two different decks. Let X be the value of the card from the first deck and Y from the second.

- How would you describe the set of all possible outcomes for (X, Y) ?
- If both cards are red, what does this tell you about their joint outcome?

Marginal and Conditional Distributions

Puzzle 3:

Suppose you survey students about their favorite fruit (apple or banana) and favorite sport (football or cricket). You record the pair of choices for each student.

- How would you find the overall popularity of apples, regardless of sport?
- If you know a student likes cricket, how would you find the chance they also like bananas?



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Puzzle 4:

In a factory, machines produce items that can be either defective or non-defective, and can be made in either the morning or evening shift.

- How would you find the probability that an item is defective, without caring about the shift?
- If you know an item was made in the evening, how would you find the probability it is non-defective?

Covariance

Puzzle 5:

You record the number of hours two siblings spend on homework and video games each day. Some days, both spend lots of time on homework; other days, both spend little.

- If you notice that when one spends more time on homework, the other does too, what does this say about their relationship?
- What if, when one spends more on homework, the other spends more on video games?

Correlation

Puzzle 6:

A scientist studies the heights and weights of a group of people.

- If taller people in the group also tend to weigh more, how would you describe the correlation?
- If there is no clear pattern between height and weight, what does this mean about the correlation?



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Regression

Puzzle 7:

A teacher tries to predict students' test scores based on the number of hours they study.

- How could the teacher use the data to make predictions for future students?
- If the teacher finds that more study hours generally lead to higher scores, how would this influence the prediction?