Probability Methods in Engineering

CSE-209

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Lecture 13

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Probability Mass Function

- pmf of a discrete RV X is

$$p_X(x) = P[X = x] = P\left[\{\zeta : X(\zeta) = x\}\right]$$

- Properties

$$p_X(x) \geq 0$$

$$\sum_{x \in S_X} p_X(x) = 1$$

$$P[X \text{ in } B] = \sum_{x \in B} p_X(x) \text{ where } B \subset S_X$$

Examples (cont.)

- Let X be the number of heads in three independent tosses of a coin. Find the pmf of X. (Binomial RV)

Examples (cont.)

- Let Y be the number of points obtained for each outcome in three independent tosses of a fair coin such that 8 points are awarded for three heads, 1 point for two heads and no point otherwise. Find the pmf of Y.

Examples (cont.)

- Let X be the number 0 (failure) if tails occur and 1 (success) if heads occur in a toss of a fair coin. Find the pmf of X. (Bernoulli RV)

Examples (cont.)

- Let X be the number of times a message needs to be transmitted until it arrives correctly at its destination. Find the pmf of X (Geometric RV). Find the probability that X is an even number.

Examples (cont.)

- A fair die is rolled once. Let X be the outcome of the experiment. Find the pmf of X. (Uniform RV)