

Random Variables

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Two Types of Random Variables

- A random variable assumes numerical values associated with the random outcomes of an experiment, where one (and only one) numerical value is assigned to each sample point
- Random variables that can assume a countable number (finite or infinite) of values are called discrete
 - Number of...
- Random variables that can assume values corresponding to any of the points contained in one or more intervals (i.e. values that are infinite and uncountable) are called continuous
 - Time, depth, weight

Probability Distributions for Discrete Random Variables

- Must specify the possible values the random variable can assume and the probability associated with each value
- The probability distribution of a discrete random variable is a graph, table or formula that specifies the probability associated with each possible value the random variable can assume
 - $P(x) \geq 0$ for all values of x
 - $\sum p(x) = 1$
- The mean, or expected value, of a discrete random variable x is
 - $\mu = E(x) = \sum (x p(x))$
 - The expected value is the mean of the probability distribution
 - Mean value of x in an infinite number of repetitions of the experiment
- The population variance σ^2 is the average of the squared distance of x from the population mean μ
- The variance of a discrete random variable is
 - $\sigma^2 = E[(x - \mu)^2] = \sum (x - \mu)^2 p(x)$
- The standard deviation of a discrete random variable is equal to the square root of the variance
 - $\sigma = \sqrt{\sigma^2} = \sqrt{\sum (x - \mu)^2 p(x)}$