Chapter 3

Discrete Random Variables

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Random Variables

For a given sample space of some experiment, a random variable (rv) is any rule that associates a number with each outcome in the sample space. In mathematical language, an rv is a function from the sample space to the set of real numbers.

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Example

Roll a die. Specify the following random variables:

a) X(s)=s

b) Y(s)=2s-1

c) Z(s)=1 if s is even and Z(s)=0 if s is odd

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Bernoulli Random Variables

Any random variable whose only possible values are 0 and 1 is called a Bernoulli random variable.

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Example

Roll two dice. Specify the following random variables:

a) X(s) is the sum of both numbers

b) Y(s) is the number of even numbers

c) Z(s)=1 if the sum is smaller than 7 and Z(s)=0 otherwise

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Discrete Random Variables

A random variable that takes finitely or at most countable infinitely many values is called a discrete random variable. Otherwise it is called a continuous random variable.

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Example

a) Roll a die until the sum of all numbers exceeds 10

b) Roll a die until the first 6 comes up

c) Pick a random number between 0 and 1, let X(s)=10s