Chapter (4)

Random Variables (r.v.) المتغيرات العشوائية

Random Variables: is a real valued function whose numerical values are determine by the outcomes defined in a sample space (S)

$X : S \longrightarrow \mathbb{R}$

There are two kinds of r.v.

1- Discrete random Variables (D.r.v.) متقطع
2- Continous random Variable (C.r.v.) مستمر

Example:

1- **Discrete Random Variable:** A random variable that takes a discrete values is called D.r.v.

Ex(1) let X be a number of head in tossing of one coin

$S = \{H, T\}$

X = number of heads

$X = 0, 1$

Probability mass function دالة كتلة الاحتمال

if the r.v. X is D.r.v, then the Prob. function of its values is (p.m.f.) and defined as

$P(x) = P(X = x) \quad ; \quad x = x_i, \quad i = 1, 2 \ldots$

probability mass function (p.m.f)

* الصغير بالانجليزي small

let X be a discrete random variable and let $x_1, x_2, \ldots$, be distinct values that X may assume.

Then the function, $p(x)$, defined by

$$p(x) = \begin{cases} P(X = x_i) & , x = x_i \quad i = 1, 2, \ldots \\ 0 & , x \neq x_i \end{cases}$$

is defined the probability mass function of the random variable X

properties of p.m.f.

1) $0 \leq p(x) \leq 1$

2) $\sum_{\forall x} p(x) = 1$

Ex: Three coins are thrown once. let X be the number of heads obtained,

Find the probability mass function of X?

i.e $P(X = x)$

Ⓔ Satisfy the properties of p.m.f.

3) $P(X = -3)$, $P(X = 5)$

4) $P(X > 1)$, $P(X \geq 3)$.