Random Variable:

A mandom variable is a neal valued function whose values are determined with the outcomes of a random experiment. It is usually denoted

highening - Hisard is one two mithally onestables

Let us consider the experiment of tossing two fair coinso. The sample sopace of the experiment is, (1) S = {HH, HT, TH, TT}

Let x denotes the number of heads, so,

Sample point Number of head

HH

HT

TH

TT

Hene, x can take the Valuer 0,10 and 2, Thenefore x is a mandom Variable. 63.0 -

Typero of random Variable:

(m) P[AD8]

 $S_{\mathrm{E}}(n) = P(\vec{n}) = (-P(\vec{n}))$

(II) PIA)

O disente mandom, variable but A socie 3 - [AMA] 9 9102

O Continuous mandom Variable

some Places - Plane)

Disente mandom Variable: A mandom Variable is called disente mandom Variable if it can take only isolated Valuers. En:-family members, mobile number et e.

Continuous non dom Variable: A nandom Variable is called Continuous nandom Variable if it can take any Values between centain limits. En. Age, weight etc.

Probability function and probability density function:

Probability function: A function for of a diserrete nandom Variable x is called a probability function if it radisfiers the following two conditions.

(i) f(x)≥0

milition If mothermerical respectation to avillable

Probability density function: A function fine of a continuous mandom variable X is called a probability density function if it satisfies the following two conditions.

Then Flax is a FB [X] + a FB [X] + b cube no Σ (xi) Σ

(ii) IP. X and Y are mandon variabless then.

(iii) IP. X and Y are prendon variabless then.

(v) If x and Y cose stone down variotion then

Continuous random variable with probability

function on probability density function fur). Then

the mathematical expectation by x is usually

denoted by E[x] on a and defined by

M = EIN] = | Enfluir, de Ifing xois andisente id admit

(i) -900 20

M = E[x] = \int x f(n) dn; If x is a continuous nandom Variable (e.n.v)

Properties of mathemotical expectation of a random

Voriable: a 90 (mit noilemil a mailemil phiants philidedon't

mility IT alis a constant then E[a] = a de constant in a paint of the constant of the constant

(ii) If x is a mandom variable with expectation E[x],
then E[ax+b] = a EB[x]+b where a and b is constant.

1 - 41M) qu - 1

(iii) E[ax] = aE[x]

(iv) If x and Y are mandom Variables then E[X+Y] = EE[X] + E[Y]

(v) If x and y one mandom vario(b) then E[x-Y] = E[X] - E[Y] -

Properties of Variance of a nandom Nariable:

- (i) If a is a constant the V[a] =0
- (ii) If x is a random variable, then V[ax+b] = a2V[x] where and b constant.
- (iii) $V(a,x) = a^2V(x)$
- (iv) V[X+Y] = V[X] + V[Y]
- (v) V[X-Y] = V[X] V[Y]
- (vi) $V[x] = E[x E(x)]^2 = E(x)^2 [E(x)]^2$.

Probability density function was to a Villand in

= (c.65 3 - p3)

- O Determine the value of k
- @ p(x < 0.65)
- 3 P(X >0-30)
- @ p (0.25 (x (0.75)
- 6 E[x] on E[7x+9]
- @ V[x] on V [7x+9]
- 1 5D(x)

Solution: (i) We know. Joo fin dn = 4 (x) vep = [4 +xu] v mont stantant months to si x 45 (in on, k / dx = 11 ban - 2000 din on, $k \left[\frac{3}{3} \right]_{0}^{1/3} = (x_{1}, x_{2}) \vee (x_{3}) \vee (x_{3$ on, $k_3 (x_1^3 - 0^3) = (y + x) y$ (vi) $\frac{3}{(x)} \frac{1}{(x)} \frac{1}{(x)} = \frac{3}{(x)} \frac{1}{(x)} = \frac{3}{(x)} \frac{1}{(x)} = \frac{1}{(x)} \frac{1}{(x)} \frac{1}{(x)} = \frac{3}{(x)} \frac{1}{($ Therefore, fin) = 3x2; 0 \(\text{N} \lambda 1. Problem-1: A continuous unndem Variable X has the following (iii) Probability that x less than 100.65 therests Williams $P(x < 0.65) = \int_{0.65}^{0.65} 3x^{2} dx \quad [k=3]$ @ Determine the value of k $=3\int_{0.65}^{0.65} x^2 dx$ (83.07x)d (3 (3) P (X >0.30) = 3 10.65 @ P (0.25 X X & C. 75) $= 3 \left[\frac{\chi^3}{3} \right]^{0.65}$ (5) E[X] on F[7X+3] [CHX] on V[TXH3] $= (0.65^3 - 0^3)$ (i) 50 (x) = 0.274.

(3+(1.11)) Probability that
$$x = 3$$
 greater than 0.30 is $P[n>0.30]$

$$= 3 \int_{0.30}^{1} x^2 dx$$

$$= 3 \cdot \left[\frac{n^3}{3}\right]_{0.30}^{1}$$

$$= (1^3 - 0.30^3)$$
(3+(1.11)) $= 0.973$.

[iv) Phobability that X lies between 0.25 and 0.75
$$P(0.25 < x < 0.75) = \int_{0.25}^{0.75} 3x^2 dx \quad [k=3]$$

$$= 3 \int_{0.25}^{0.75} x^2 dx$$

$$= 3 \left[\frac{x^3}{3} \right]_{0.25}^{0.75}$$

$$= [0.75^3 - 0.25^3]$$

$$= 0.406$$

$$E[7x+9] = 78E[n] + 9 [E[ax+b] = aE[n]+b]$$

= $7 \cdot \frac{3}{4} + 9$

$$\frac{180}{180} \quad V(x) = \frac{1}{5} \left[\frac{1}{5} x^{2} \right] - \frac{1}{5} \left[\frac{3}{4} \right]^{2} \\
= \frac{3}{5} \left[\frac{1}{5} - \frac{3}{10} \right] - \left[\frac{3}{4} \right]^{2} \\
= \frac{3}{5} \left(\frac{1}{5} - \frac{5}{10} \right) - \left(\frac{3}{4} \right)^{2} \\
= \frac{3}{5} \left(\frac{1}{5} - \frac{9}{16} \right) - \frac{3}{16} \\
= \frac{3}{80}$$

.: V(7x+9) = 72V(x) + 0 [$V(ax+b) - a^2V(x) + 0$] = 49 X 3 Biocomical offerhabition (decrease the light buttern) (Fri com distribution 1 docume) 08 (3) roumed distribution (continued). (vii) 3D(x) = JV(x)

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The state of the solution of the solutio $=\frac{\sqrt{15}}{20}$ (Ams) complished as a conference of confe where n end p are the periameterns of the Lepty bons noithbirthelb Committee of the contraction of foods of ansamplais Here, 11 - numben of mier! ११ - Dumbert CP हारवर्णां - भ P = pushability of surcess = 3 Securetien of historied distribution: Four properties of of Pinemial.

Co. The sample occasists of a timed number tote checking.

induction is classified into one of the