

(An Autonomous Institution) Coimbatore – 641 035 DEPARTMENT OF MATHEMATICS UNIT-1(PROBABILITY AND RANDOM VARIABLES)



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provede R.	Ν,	continuous R.V.	
5t	N	. ♦	
ot moment: u' = E1	(x)= \(\frac{1}{2}\) \(\frac{1}{2}\)	Jxf(x) dx	
dmoment: un - c	$(x^{a}) = \sum_{i=1}^{2} x_{i}^{2} P(x_{i})$	$\int_{-\infty}^{\infty} f(x) dx$	
Q - E	isl	0	
idbi	. 3) n 23 n/2	254.24	
Moment: 113 = E	$(x^3) = \sum_{i=1}^{n} \infty_i^3 P(x)$	$\int_{-\infty}^{\infty} x^3 f(x) dx$: -7
	7" in ""	, P	
th	WY S WY OW	$\int_{-\infty}^{\infty} x^{2} + (x) dx$	
11)011@14. My = E	(x)= 2, pla;	-0	
mean: ui		· [+ p/4 - 3/	
Variance: 42 = 1	$u_{2}-(u_{1})$.1. /	
T To don CPto	y function of	Random Variable.	X
The markets			
- 98 . F(x) = Ka	((&-20), のと又と	Random Variable. 2. Find K, mean.	· · ·
18 F(x) = Ha	((&->U), 0 \ X \ \	a. Find K, million.	ř
rectance, resolutions	((&->u, 0 = x =	a. Find K, mean.	ř
rectance, rosolo.	((&->0, 0 \ X \)	a. Find K, mean.	Σ. Λ.:
rectance, rosolo.	$((8-30), 0 \le X \le 1)$	a. Find K, meds.	7
18 F(x) = Ha Voculance, r Soln. i) Fand H.	$((8-30), 0 \le X \le 1)$ the moment $(x \le 1)$ $(x \le 1)$ $(x \le 1)$ $(x \le 1)$	a. Find K, means	7
18 F(x) = Ha Voculance, T Soln. i). Find H.	$((8-30), 0 \le X \le 1)$ th moment: $(x) dx = 1$ $(x) dx = 1$	a. Find K, means	7
18 F(x) = Ha Voeclance, r Soln. i) Fand K. \$\int_{-\infty}^{\infty} F(x) = Ha Rac($((8-30), 0 \le X \le 1)$ the moment is a constant in the consta	a. Find K, meds.	
18 F(x) = Ha Voculance, r Soln. i) Find K. \$\int \text{Sol} F(x) = Ha \text{A} \text{A} \text{A} \text{A} \text{A}	$((8-30), 0 \le X \le 1)$ the moment is a constant in the consta	a. Find K, meds.	
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Youlance, resolvence, resolven	$((8-30), 0 \le X \le 1)$ the moment is a constant in the consta	a. Find K, mean	

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$$K \left[\frac{12-8}{3} \right] = 1$$

$$K \left[\frac{4}{3} \right] = 1$$

$$K = \frac{3}{4}$$

$$K' = F \int X^{T}$$

$$= \int_{-\infty}^{\infty} X^{T} + f(x) dx$$

$$= \frac{3}{4} \int_{0}^{2} 2^{x+1} (2-x) dx$$

$$= \frac{3}{4} \int_{0}^{2} 2^{x+1} - x^{x+2} dx$$

$$= \frac{3}{4} \left[2 \frac{x^{x+2}}{x+2} - \frac{x^{x+3}}{x+3} \right] dx$$

$$= \frac{3}{4} \left[2 \frac{x^{x+2}}{x+2} - \frac{x^{x+3}}{x+3} \right] - 0$$

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$$= \frac{3}{4} \left[2 \frac{x^{x+2}}{x+2} - \frac{x^{x+3}}{x+3} \right]$$

$$= \frac{3 \cdot 2^{x} \cdot 2^{3}}{4} \left[\frac{x+3-(x+3)}{(x+3)(x+3)} \right]$$

$$= \frac{3 \cdot 2^{x} \cdot 8}{4} \left[\frac{x+3-x-2}{(x+2)(x+3)} \right]$$

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Mean: $\begin{aligned} & (u_1') \\ & \text{Put } r = 1 \text{ Pn } \mathcal{U}_{r}' \\ & \mathcal{U}_{1}' = 6. \text{ a}^{1} \left[\frac{1}{(1+2)(1+3)} \right] \\ & = \frac{12}{12} \\ & \mathcal{U}_{1}' = 1 \\ & \text{mean } = 1 \Rightarrow \text{ E}(x) = 1 \\ & \text{Variance } (u_2): \\ & \text{Variance } (u_2):$

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ル) = <u>6</u>

:. $VOSI(\infty) = u_2^1 - (u_1^1)^2$





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In the continuous landom variable
$$x$$
 at the period $f(x) = \int \frac{1}{2} (x+1), -1 < x < 1$

The period $f(x) = \int \frac{1}{2} (x+1), -1 < x < 1$

To, otherwise $f(x) = \int \frac{1}{2} (x+1) dx$

Solh.

The continuous landom variable x at $f(x) = \int \frac{1}{2} (x+1) dx$

$$= \int \frac{1}{2} \int (x^2 + x) dx$$

$$= \int \frac{1}{2} \int (x^2 + x) dx$$

$$= \int \frac{1}{2} \left[\frac{x^3}{3} + \frac{x^2}{2} \right]^{\frac{1}{2}}$$

$$= \int \frac{1}{2} \left[\left(\frac{1}{3} + \frac{1}{2} \right) - \left(\frac{-1}{3} + \frac{1}{2} \right) \right]$$

$$mean = 1 \\ 3$$

May sance

$$Vox_{x} = E(x^{2}) - (E(x))^{2}$$

$$E(x^{2}) = \int_{-\infty}^{\infty} x^{2} + (x) dx$$

$$= \int_{-\infty}^{\infty} x^{2} \frac{1}{2} (x+r) dx$$

 $=\frac{1}{2}\left[\frac{1}{3}+\frac{1}{2}+\frac{1}{3}-\frac{1}{2}\right]$

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$$= \frac{1}{2} \int_{2}^{1} (x^{3} + x^{2}) dx$$

$$= \frac{1}{2} \left[\frac{x^{4}}{4} + \frac{x^{3}}{3} \right]_{-1}^{1}$$

$$= \frac{1}{2} \left[\frac{1}{4} + \frac{1}{3} - \frac{1}{4} + \frac{1}{3} \right]_{-1}^{1}$$

$$= \frac{1}{2} \left[\frac{1}{4} + \frac{1}{3} - \frac{1}{4} + \frac{1}{3} \right]_{-1}^{1}$$

$$= \frac{1}{2} \left[\frac{2}{3} \right]_{-1}^{2}$$

$$= \frac{1}{3} - \frac{1}{3}^{2}$$

$$= \frac{1}{3} - \frac{1}{3}^{2}$$

$$= \frac{3-1}{9}$$

$$Var(x) = \frac{2}{9}$$

$$Var(x) =$$

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+ E(ax) = a E(x)
                              1 h a + 4 = 120 E &
* V(\alpha) = 0
* V(\alpha_x) = \alpha^9 V(x)
* Y(ax+b) = a^2 Y(x)
* If x & y are prodopendent, then E(xy) = E(x) \cdot E(y)
J. If x and y are Independent Tandom Daviable
   with vortance a and 3. Frnd vasi(3x+4y)
   Soln.
  (\underline{v}\underline{v}). (\underline{v}\underline{v}) = 2 and (\underline{v}\underline{v}) = 3
  NOW YOU (3x+44) = VON (3x) + VON (44)
                        = 9 vari(x) + 16 vari(y)
                         = 9(2) + 16(3)
                         =18+48 th == (rate dr
         VO9(3x+44) = 66
J. Coven the following probability diction
of x.

x - 3 - 2 - 1 0 1 2 3

x - 3 - 2 - 1 0 0 0.30 0.15 0.10

P(x) 0.05: 0:10 0.30 0.10 0.30 0.15 0.10

Compute i). E(x) ii). E(x^2) iii). E(2x\pm 3)

iv). Vor(2x\pm 3)
```

Soln. $E(x) = \sum_{i=1}^{7} x_i P(x_i)$ Scanned with CamScanner



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$$= -3(0.05) - 2(0.1) - 1 (0.3) + 0 + 1(0.3) + 1 + 1(0.3) + 1 + 1(0.15) + 3(0.1)$$

$$= 0.25$$
ii) $E(x^2) = \frac{1}{1-1} x_1^2 P(x_1)$

$$= (-3)^2 (0.05) + (-2)^2 (0.1) + (-1)^2 (0.3) + 0 + 1 + 1^2 (0.3) + 2^2 (0.15) + 3^2 (0.1)$$

$$= 2.95$$
iii) $E(2x \pm 3) = E(2x) \pm E(3)$

$$= 2(0.25) \pm 3$$

$$= 0.5 \pm 3$$
iv) $Vor_1(x) = E(x^2) - (E(x))^2$

$$= 2.95 - (0.25)^2$$

$$= 2.887$$

$$Vor_2(2x \pm 3) = 2^2 Vor_2(x) = 4 (2.887)$$

$$= 11.548$$
Huu J. #PDF of x is given by $f(x) = \frac{1}{2}(1-x)$, $0 \ge x(1)$

$$= 11.548$$
Show that i) $E(x^2) = \frac{2}{(7+1)(x+2)}$
ii) Using the result, to evaluate
$$E(3x+1)^2$$

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