Discrete Joint Probability Distribution FPD1

Example: A coin is tossed three times.

X = 0 or 1 according Tail or Head

Occurring on the FIRST toss

Y = Number of Tails.

Determine (1) The Marginal distributions

of X and Y.

(ii) Joint PDF of X and Y.

(iii) Expected values X+y and XX.

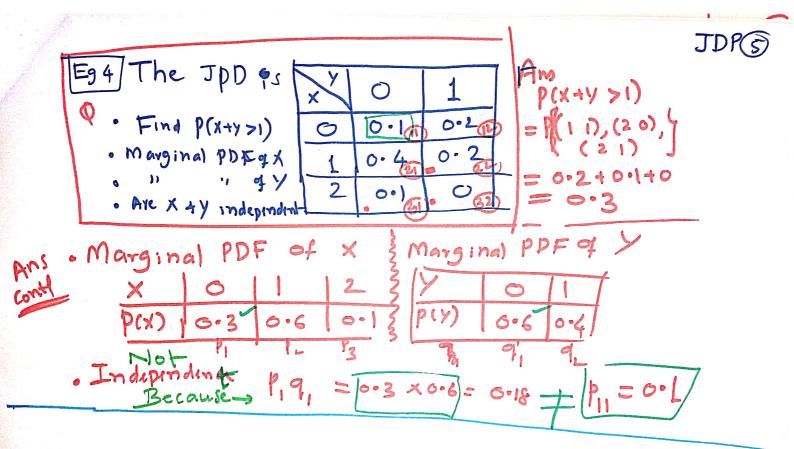
Ans (1) Sample space = = {HHH, HHT, HTH, THH, HTT (i) Marginal PDF (M) Marginal PDF of Y (0+0)(0)+(0+1)(18) + (0+2)(48) + (0+3)(48) + (1+0)(1/8)+(1+1)(2/8)+(1+3)(0  $E(XY) = \xi \lambda_i y_i P_{ij} = 1$ 

Eg@ The distributions of two stochastically independent random variables X and Y are X 10 11 12 B Find Joint PDF

Ans

X¢ y-	1	2	3	bex)	
0	0.02	0.08	0.10	0.2	
2	0.08	0.32	0.40	0.8	
pcy)-	1.0 /	0.4	0.5	1	

JPD4 Egg The joint PDF of two random Variables × and y is 3 Determine individual 0.06 0.15 0.09 Cor marginal) distri --butions, X, Y. Verity whether 0.35 0-21 0.14 2 X & y are independent 43 42 X=X! PCXIL 3 (=2 P(x) 6.3 0.09 0.06 0.15 P, 261 P13 P12 þ11 0-21 0.7 0.35 0-14 PL P2 3 P22 P21 & Pis = 2 1; 0.3 0.5 0.2 bcA) 93 = 29; X + y are independent ; for 1 = 1,2 P12 = (0.15) P193 = P13 =



## Definitions

JPD(8)

Joint PDF of two  $\gamma.v.$  X=x: j=1...m  $Y=Y_j$  j=1...nis  $P_{ij}=P(x_i y_j)$  st  $0 \le P_{ij} \le 1$   $f \ge P_{ij}=1$ 

	X	7,	4_	43		Yn \	2 Mean q.X =E(x) = Mx
	7	t,	PIL	P13	, , ,	Constitution	= 5 Pix:
	× <sub>L</sub>	P22	Pzi	P23			Mean of Y E(Y)=My
1	1		à à	:	٠.,		\= £9,7;
	SIM	bim	Pam	bym		hun	B variance $X$ $6x^2 = E(x^2)$
		J	PD.	Tab	le.		$-(4x)^2$

(3) Cov(xy) = E(xy) - Mx My (4) Correlation = Cov(x, y)

## 95 A Joint PDF 15

X	Y.	-3	2	4
1		0.1	0.2	0.2
	3	0.3	011	0.1

Find. Mean of X Mean of y Variana of x Variancedy Cov (x, y) Conff J(X, Y)



 $M_{X} = E(X) = Mean X = \{ x_{1}, p_{1} = x_{1}p_{1} + X_{2}p_{2} = 1(0.5) + 3(0.5) = 2 \}$ 

JPD(8) E(x2) = x1 1, + x2 2 = (1) 0.5 + 3(0.5) = 5  $E(y^2) = y^2 y_1 + y^2 y_2 + y^2 y_3 = (3)^2 (6.4) + 2^2 (.3) + 4^2 (0.3) = 9.6$ Variance X = [5] = E(x2) - (4x)2 = 5 - (2)2 = 5-4 = 1 Variana  $y = 5y^2 = E(y^2) - (\mu_y)^2 = 9.6 - (9.6)^2 = 9.6 - 0.36$ = 214 P11 + ···· + 2/2 /3 P23 = 103 ( x8 y indpose) Cov(X, Y) = E(XY) - JE(X) E(Y)= E(XY) - JIX JIY= G - 2(0.6) = [-1.2] = Cev(X, Y) = relation bet X+Y = f(X, Y) = Cev(X, Y)