Joint probability distributions and Random samples 121 Chapter sibolaxion pulyangunossos sob of exadada Y pas Let X and Y be two discrete tzv's defined on the sample space S of an experiment. The joint probability mass function p(x,y) is defined for each pairs of numbers (x,y) by p(x,y) = P(x=x and y=y). It must satisfy the following conditions; 9) Find P(X=1 and Y=1) = b(L1) = 0.2 0 ≪ (8, ∞) q (1) The (marginal) probability, mass, function of Xx, denoted by (p; (\alpha); \is given by ... (1.1) q+ (0.1) q+ (1.0) q+ (0.2) q  $P_{x}(x) = \sum_{i=1}^{n} P(x_{i}y_{i})$  for each possible value of x. Similarly, the marginal probability mass function of Y sedenoted south & (b) is forgiven by c + y box 0 + x)  $k_{y}(y) = \sum_{p} \frac{1}{p(x,y)} \text{ for each possible value } y.$  (5.50) + (1.50) + (1.50) + (1.50) = (0 + y) + (0.50) + (0.50) = (0 + y) + (0.50) + (0.50) = (0.50) + (0.50) = (0.50) + (0.50) = (0.50) + (0.50) = (0.50) + (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50) = (0.50)E.g. A service station has both self-service and full-service islands. On each island, there is a single regular unleaded pump with two hoses! Let X denote the number of hoses being used on the self-service is land at a particular time, and let Y adenote, the number = of hoses on the full-service

islandanin rusered that itimediathes joint april of 1x and Y appears in the accompanying tabulation. The Let X and Y be two discrete I ray's eletined on the philips (2) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 To six function part of 10.00 defined for leach pair of 2. (8.06) bross 2:14) 9 = (8.00) 3. 84 (8.00) 2012 drawn  $\frac{\chi}{=}$ Hunst Datiof the following conditions; a) Find P(X=1 and Y=1) = p(1) = 0.2 0 (1) . 1= (1/10)d \( \frac{1}{\infty} \) \( \frac{1}{\infty} \) \( \text{On} \) b) Find P(X & I and Y & I) (x=0, Y=0), (x=0, Y=0), (x=0), (x=0), (x=0), (x=0), b(co) + b(o,1) + b(1,0) + c(1,0) + c(0,0) d + c(0,0) d x fo sular Billissoq dono rof (με) q = 0.42. (πε) γ ος (ξε) φς γ c) Word description of the event (x +0 and Y +0)
to nothing 2220th stillidadord billity of this event compute the probability of this event inic (x = 0 and y = 0) = At least one of the hosen travely h(3) = The party for each possible value y. P(x +0 and Y +0) = P(1,1) + P(1,2) + p(2,1) + p(2,2) Eg. A service station has both self-service and Juli-service islands. On each island, there is a fully compute the marginal party two hosesquest single rejudar unleaded pump with two hosesquest out of (XXI)?

Single rejudar is pump (XXI)?

Showle the mamber of hoses being used on the self- servic(200) + (200) 4. + (200) + (200) + (2002) iv 102 - 102 95/v 672 - 11st sat no 2020d p(x20) = 0.10 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 + 10.02 +

$$| p(x,1) = 0.08 + 0.2 + 0.06 = 0.34 
 | p(x,2) = 0.06 + 0.14 + 0.3 = 0.5 
 | .'. | p_x(x) = 0.16 + 0.34 + 0.5 = 1.0$$

$$P_{\gamma}(y) = \sum_{x \in \{0,12\}} p(x,y) = p(0,y) + p(0,y) + p(0,y) + p(0,y) + p(0,y) = 0.29 + 0.38 + 0.38$$

P(X < 1) = Px (0) + Px (1) = 0.16 + 0.34 = 0.5.

Define Two random variables X and Y are said to be independent if for every pair of x and y values  $p(x,y) = p_{x}(x) \cdot p_{y}(y)$ 

when X and Y are discrete.

If X and Y not satisfied the above condition for all (x,y), then X and Y are said to be dependent.

e) Ane X and Y independent rv3.

We have, 
$$P_{x}(2) = 0.5$$
,  $P_{y}(2) = 0.38$   
 $P_{x}(2) \times P_{y}(2) = 0.5 \times 0.38 = 0.19$ .  
 $P(2,2) = 0.3$ .

· Px(2) · Py(2) = p(2,2).

. Therefore, X and Y are independent rus.

selected questions.