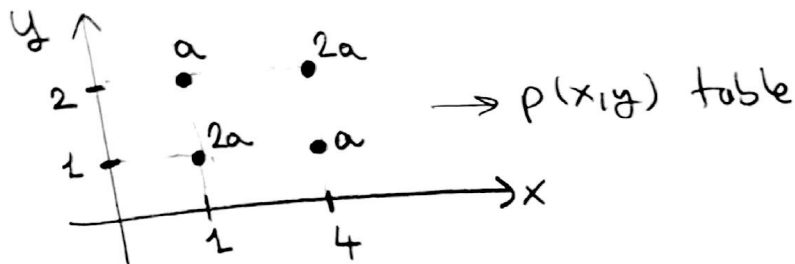
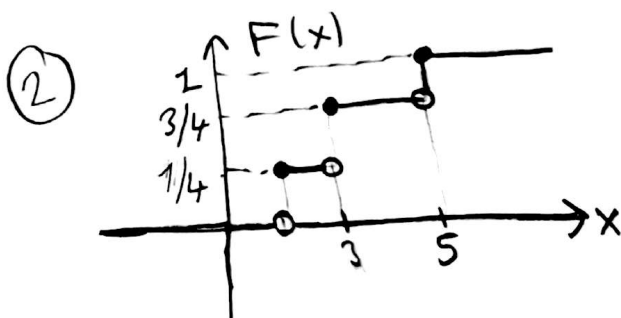


①  $\tilde{X}$  and  $\tilde{Y}$  are two disc. RVs

$p(x,y) \rightarrow$  joint prob. mass function of these RVs is given as follows



- a) Find  $a$       b) Find  $p(x|y)$   
 c) Find  $p(y|x)$       d) Find  $p(x)$   
 e) Find  $p(y)$       f)  $E(\tilde{X})=?$   
 g)  $\text{Var}(\tilde{X})=?$       h)  $\text{Var}(\tilde{Y})=?$   
 i)  $E(\tilde{X}|\tilde{Y}=y)=?$       j)  $\text{Var}(\tilde{X}|\tilde{Y}=y)=?$



$\rightarrow$  Cumulative distribution function of R.V.  $\tilde{X}$

- a) Find prob. mass function  $p(x) = \text{Prob}(\tilde{X}=x)$   
 b)  $\text{Var}(\tilde{X})=?$   
 c) If  $\tilde{Y} = 2\tilde{X} + 1$        $E(\tilde{Y})=?$   
     $\text{Var}(\tilde{Y})=?$

③  $\hat{X}$  and  $\hat{Y}$  are two disc RVs

$p(x|y)$  is given as

$$p(x=1|y=2) = 1/4 \quad p(x=2|y=4) = 1/2$$

$$p(x=2|y=2) = 3/4 \quad p(x=2|y=4) = 1/2$$

Find  $E(\hat{X}|\hat{Y}=y)$ ,  $E(\hat{X}^2|\hat{Y}=y)$

$\text{Var}(\hat{X}|\hat{Y}=y)$

④  $S = \{s_1, s_2, s_3, s_4, s_5, s_6\}$  → Sample space of an experiment

$\hat{X}$  → Disc. R.V.

$$\hat{X}(s_1) = -1 \quad \hat{X}(s_2) = 0 \quad \hat{X}(s_3) = 1 \quad \hat{X}(s_4) = 1$$

$$\hat{X}(s_5) = -1 \quad \hat{X}(s_6) = 1$$

$$A = \{s_1, s_2, s_5, s_4\}$$

a) Find  $p(x)$  → prob. mass function

b) Find  $p(x|A)$  → cond. prob. mass function

c) Verify that  $\sum p(x) = 1$

$$\text{and } \sum p(x|A) = 1$$

⑤  $\hat{X}$  → disc. R.V.  $S$  → Sample space

$A_1, A_2, \dots, A_j$  are disjoint events that form a partition of  $S$

Show that  $p(x) = \sum_{i=1}^n p(x|A_i) p(A_i)$