

Q: H.W.

مسألة

احتمال / رقم (45)

let the r.v. X be the number of white balls if we drawn a sample of size (2) balls from an Urn Contains 4: white and 3: red balls, Find

① P.m.f. of X and graph it.

2) C.D.F. of X and graph it.

3) $P(1 \leq X < 3)$.

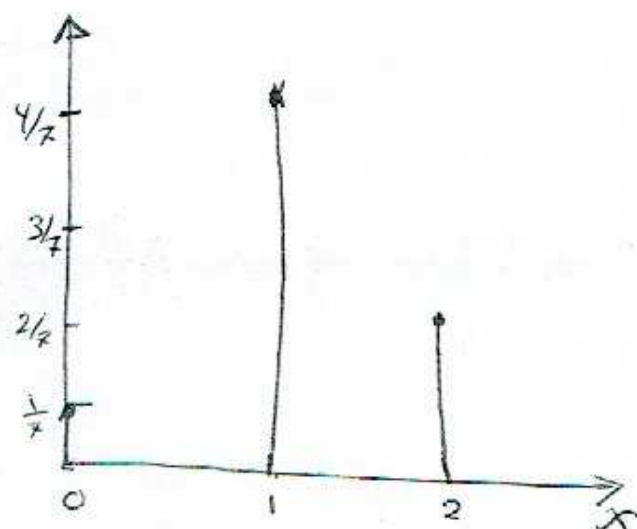
4) $P(1.5 \leq X \leq 3.5)$.

$$\begin{bmatrix} 4W \\ 3R \end{bmatrix} \rightarrow 2$$

$X = \text{white ball}$

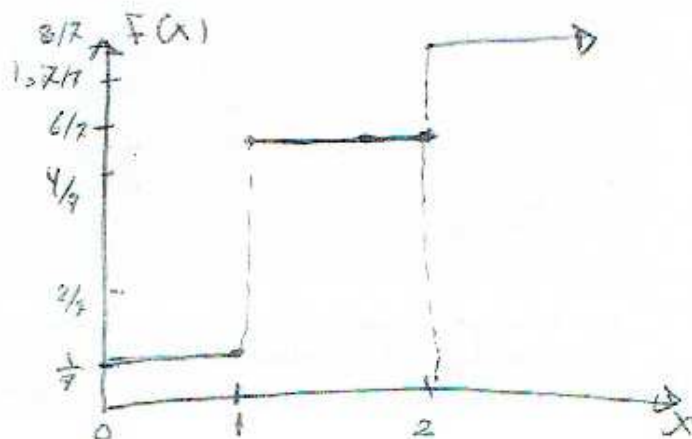
Sol $X = 0, 1, 2$

$$1) P(X) = \begin{cases} \frac{C_2^3}{C_2^7} = \frac{1}{7} & ; X=0 \\ C_1^3 \cdot C_1^4 / C_2^7 = \frac{4}{7} & ; X=1 \\ C_2^4 / C_2^7 = \frac{2}{7} & ; X=2 \\ 0 & ; \text{o.w.} \end{cases}$$



$$2) \text{C.D.F.} = F(x) = P(X \leq x) = \sum_{u=-\infty}^x P(u)$$

$$\therefore F(x) = \begin{cases} 0 & x < 0 \\ \frac{1}{7} & 0 \leq x < 1 \\ \frac{5}{7} & 1 \leq x < 2 \\ 1 & x \geq 2 \end{cases}$$



$$3) P_r(\overset{a}{1} \leq x \leq \overset{b}{3}) = F(3) - F(1)$$

$$= P(X \leq 3) - P(X \leq 1)$$

$$= \cancel{P(0)} + \cancel{P(1)} + P(2) - [P(0) + \cancel{P(1)}]$$

$$= P(2)$$

$$= \frac{2}{7}$$

$$4) P(1.5 \leq x \leq 3.5) = F(3.5) - F(1.5)$$

$$= P_r(X \leq 3.5) - P_r(X \leq 1.5)$$

$$= P(0) + P(1) + P(2) - P(0) - P(1) = P(2) = \frac{2}{7}$$

Ex(3) If X random variable with p.d.f. defined as

$$f(x) = \begin{cases} \frac{1}{2} & , 0 \leq x \leq 2 \\ 0 & , 0 - \infty \end{cases}$$

Find $F(x)$

$$F(x) = P(X \leq x) = \int_0^x f(u) du = \int_0^x \frac{1}{2} u du$$

$$= \frac{x^2}{4} \Big|_0^x = \frac{x^2}{4} - 0 = \frac{x^2}{4}$$

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x^2}{4} & 0 \leq x \leq 2 \\ 1 & x \geq 2 \end{cases}$$

