2013 OCTOBER 2013

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SEPTEMBER '13

THURSDAY

37th Week | 255-110

12

$K x(1-x)$
$K(x-x^2)$

① Find the value of K

$$f(x) = \begin{cases} Kx(1-x) & 0 \le x \le 1 \\ 0 & \text{else where} \end{cases}$$ is a p.d.f

2) Find CDF of x.

$$\int_{-\infty}^{\infty} f(x)\, dx = 1.$$

$$= \int_{-\infty}^{0} f(x)\, dx + \int_{0}^{2} f(x)\, dx + \int_{1}^{\infty} f(x)\, dx = 1$$

$$= 0 + \frac{K}{6} + 0 = 1 \qquad \boxed{K=6}$$

$$\boxed{K = 6}$$

if $\left(x > \frac{1}{2}\right)$

$$P\left(x > \frac{1}{2}\right) = \int_{\frac{1}{2}}^{\infty} f(x)\, dx = \int_{\frac{1}{2}}^{1} f(x)\, dx + \int_{1}^{\infty} f(x)\, dx.$$

$$= \cdot \frac{3-2}{6} \cdot \left(\frac{1}{6}\right) = 4$$

C.D.F. $\Rightarrow$ Cumulative Distribution Function.

'13 SEPTEMBER

13 FRIDAY
37th Week | 256- 109

SEPTEMBER 2013

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

② ✳ ☺. $CDF = P(x) = P(X \leq x_1)$ $\int_{-\infty} f(x)\,dx$

$$\leftarrow \overset{x}{\underset{0}{\bullet}} \quad | \quad | \quad | \quad \rightarrow \infty$$
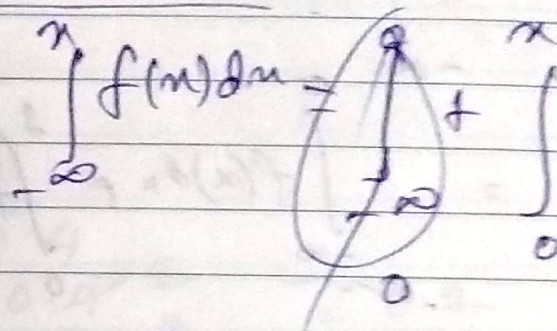$$-\infty \qquad 0 \quad 1 \quad 2 \quad 3 \qquad \infty$$
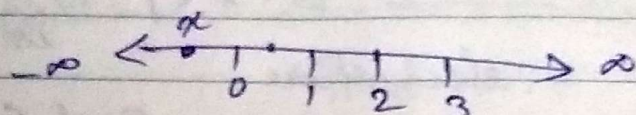
$$f(x) = \begin{cases} ax, & 0 \leq x < 1 \\ a, & 1 \leq x \leq 2 \\ 3a - ax & 2 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

$P(a) = 0 \; ; \; x < 0$

$\int_{-\infty}^{x} f(x)\,dx = \; + \int_{0}^{x}$

(i) Find a, $= \dfrac{ax^2}{2}, \; 0 \leq x < 1$

✳ (ii) Find CDF of x. $= \boxed{} \quad 1 \leq x < 2$
(between 1 & 2)

$2 \; \boxed{} \quad 2 \leq x < 3$
(between 2 & 3)

③ $P(x=0) = 3c^2$

x is discrete

$P(x=1) = 4c - 10c^2$

$P(x=2) = 5c - 1$

i) Find 'c'

ii) $P\left(0 < x < 2 \mid x > 0\right)$

$$\sum P(x=i) = 1$$

$$3c^2 + 4c - 10c^2 + 5c - 1 = 1$$
$$-7c^2 + 9c - 2 = 0$$
$$7c^2 - 9c + 2 = 0$$
$$7c^2 - 7c - 2c + 2 = 0$$
$$7c(c-1) - 2(c-1) = 0$$
$$(7c-2)(c-1) = 0$$
$$\therefore c = \frac{2}{7} / 1.$$

If we put in $P(x=0)$, $P(x=1)$, $P(x=2)$
Probability becomes constant > 1 &
$-ve$, which is not possible

$$\therefore c = \frac{2}{7}.$$

$$P\left(0 < x < 2 \mid x > 0\right) = \frac{P(x=1)}{P(x>0)}$$

$$= \frac{P(x=1)}{P(x=1) + P(x=2)}$$

Find PMF.

Probability Mass Function.

(A) $2P(x=1) = 3P(x=2) = P(x=3) = 5P(x=4) = K$

Find PMF of X.

$$P(x=1) = \frac{K}{2}$$

$$P(x=2) = \frac{K}{3}$$

$$P(x=3) = K.$$

$$P(x=4) = \frac{K}{5}$$

$$\therefore \frac{K}{2} + \frac{K}{3} + K + \frac{K}{5} = 1$$

$$= \frac{15K + 10K + 30K + 6K}{30} = 1$$

$$\Rightarrow 61K = 30$$

$$\Rightarrow K = \frac{30}{61}$$

SEPTEMBER '13

2013

OCTOBER
S M T W T F S
1 2 3 4 5
7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

TUESDAY

38th Week | 260- 105

17

⑤ $P(x=1) = \frac{1}{2^j}$ $\left[j = 1, 2, 3 \ldots - \right]$

Verify it is a P.M.F

$P(x=1) = \frac{1}{2}$

L.H.S $= \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots \quad n$

$= \frac{1}{2} \left(1 + \frac{1}{2} + \frac{1}{2^2} + \cdots \quad n \right)$

$= \frac{1}{2} \left(\frac{1}{1 - \frac{1}{2}} \right) = \frac{1}{2} \times \left(\frac{1}{\frac{1}{2}} \right) = 1 = R.H.S$

Hence it is a $\underline{\underline{PMF}}$.

⑥ A PDF $[a, 1]$ is given by $\frac{1}{x^2}$ outside the interval 0. Find the value of A.

$$\int_a^1 f(x) dx = 1.$$

$$\int_a^1 \frac{1}{x^2} dx = 1.$$

'13 SEPTEMBER

SEPTEMBER   2013

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18 WEDNESDAY

38th Week   261-104

P.d.f $f(x) = \begin{cases} \frac{2x}{25}, & 0 < x < 5 \\ 0 & \text{else where} \end{cases}$ $|x| < 1$.

$-1 < x < 1$.

Find: $P(|x| < 1)$
(i)

$P(-1 < x < 1) = \int_{-1}^{1} f(x)\,dx$.

(ii) $P(|x-1| < 2)$

$$\boxed{-1 \leq x < 3}$$

5B, 5W.

→ A bag contain 8 balls

3 balls are drawn randomly, without replacement, if x is a random variable, which takes, the value 1, if at least 2 white balls are drawn and the value 0 other

Find the PMF of x.