MOTOWOTOFOS H/W C/W Dated: / /20

Assigment NO => 2

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Section: B

Subject: PME

Submitted to:

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Date:- 09/08/2021

MOTIVATIONS H/W C/W Dated:...../...../20.....

(Question No -1)

Given:

X = no of heads obtaind by flipping Coin 4-time.

Required:

a) Plot cdf of X

b) $P[2 < X \leq 3] = ?$

$P[0.7 \leq X \leq 1.3] = ?$

$P[1 \leq X < 3] = ?$

Sol

a) Plotting

$X(S) = [0, 1, 2, 3, 4]$

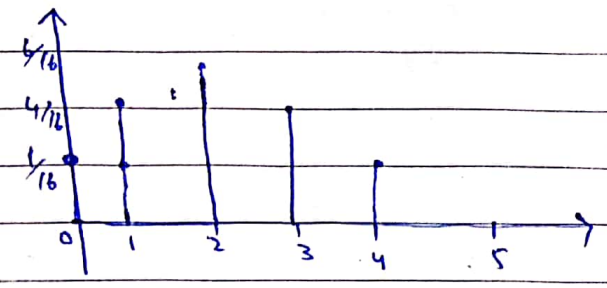
$P_X(0) = 1/16 = 0.0625$

$P_X(1) = 4/16 = 0.25$

$P_X(2) = 6/16 = 0.375$

$P_X(3) = 4/16 = 0.25$

$P_X(4) = 1/16 = 0.0625$



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(b)

$P[2 < X < 3] = ?$

$P[X > 2] = [0.0625 + 0.25]$

$P[X > 2] = 0.6875$

$P[X < 3] = P[0] + P[1] + P[2] + P[3]$

$P[X < 3] = 0.0625 + 0.25 + 0.375 + 0.25$

$P[X < 3] = 0.9375$

$\boxed{P[2 < X \leq 3] = 0.25}$

$P[0.7 \leq X \leq 1.3] = ?$

$P[0.7 \leq X \leq 1.3] = P[X \leq 1.3] - P[X \leq 0.3]$

$= 0.3125 - 0.0625$

$P[0.7 \leq X \leq 1.3] = 0.25$ Ans

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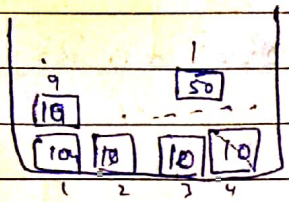
(Question No 2)

Given:



→ Two notes drawn randomly with out Replacement

Required:

a, Plot cdf = ?

b, $P[6 \leq X \leq 8] = ?$

Sol

a, Plotting = ?

X(s) = total amount when two notes drawn randomly

X(s) = {(10,10), (10,50), (50,10)}

Total no (10,10) = $\frac{9!}{2!(9-2)!} = \frac{9 \times 8 \times 7!}{2! \times 7!}$

" " = 36

Total no (10,50) = 9

" " (50,10) = 9

Total length of X(s) = 54

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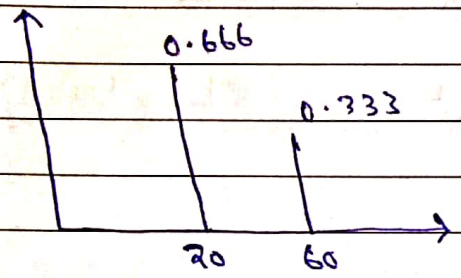
Now

$P[20] = 36/54$

$P[20] = 0.666$

$P[60] = 18/54$

$P[60] = 0.333$



(b) $P[20 \leq X < 60] = ?$

$P[20 \leq X < 60] = P[X \leq 20] - P[X < 60]$

$= 0.666 - 0.333$

$\boxed{P[20 \leq X < 60] = 0.333}$

— xx — xx — xx — xx

(Question NO : 3)

Given:

$P_k = 0.6/k^2$

$k = 1, 2, 3 \ldots$

cdf of $X = ?$ for $k = 0$ to 4

M T W T F S H/W C/W Dated:...../...../20.....

Required:

a) $P[X > 4]$

b) $P[6 \leq X \leq 8]$

Sol

X = Random Variable

$P_k = 0.6/k^2$ $k = 1, 2, 3, - -$

$P_1 = 0.6/1$

$P_1 = 0.6$

$P_2 = 0.6/4$

$P_2 = 0.15$

$P_3 = 0.6/9$

$P_3 = 0.067$

$P_4 = 0.16/16$

$P_4 = 0.0375$

$P_6 = \frac{0.16}{36} = 0.0044$

$P_8 = 0.16/64 = 0.0025$

M T W T F S H/W C/W Dated: ...../...../20.....

a) $P[x > 4]$

$$P[x > 4] = 1 - \sum_{K=1}^{4} P_K(x)$$

$$P[x > 4] = 1 - (0.6 + 0.15 + 0.067 + 0.0375 + 0.0044 + 0.0025)$$

$$\boxed{P[x > 4] = 0.1386}$$

(b) $P[6 \leq x \leq 8]$

Sol

$$P[6 \leq x \leq 8] = P[6] + P[7] + P[8]$$

$$= 0.0044 + 0.0032 + 0.0025$$

$$\boxed{P[6 \leq x \leq 8] = 0.0101}$$

— xx — xx — xx — xx — xx

(Question No ⇒ 4)

Given

Transmission time X of message in a communication system. has exponential distribution.

if $\lambda = 1$

P e Tp 0

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

Required:

a, $P[X > 3] = ?$

b, $P[2 \leq X \leq 4] = ?$

Sol

a, $P[X > 3] = ?$

$P[X > 3] = 1 - P[X \leq 3]$

$= 1 - [P[0] + P[1] + P[2] + P[3]$

$P_\lambda = \frac{\lambda^x \cdot e^{-\lambda}}{x!}$

$P_0 = \frac{1^0 \cdot e^{-1}}{0!} = e^{-1}$

$P_1 = \frac{1^1 \cdot e^{-1}}{1!} = e^{-1}$

$P_2 = \frac{1^2 \cdot e^{-1}}{2!} = e^{-1}/2$

$P_3 = e^{-1}/6$

$P_4 = e^{-1}/16$

Now

$P[X > 3] = 1 - e^{-1}(1 + 1 + 1/2 + 1/6)$

$= 1 - \frac{1}{e}(2.66)$

P φ Tf O

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

$P[X>3] = 1 - 0.982$

$\boxed{P[X>3] = 0.0175}$

(b) $P[2 \leq X \leq 4] = ?$

Sol

$P[2 \leq X \leq 4] = P[2] + P[3] + P[4]$

$= e^{-1}/2 + e^{-1}/6 + e^{-1}/24$

$= 1/e \left(\frac{12+4+1}{24} \right)$

$= 1/e \left(17/24 \right)$

$P[2 \leq X \leq 4] = \frac{1}{e}(0.7083)$

$\boxed{P[2 \leq X \leq 4] = 0.2609}$ Ans

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

(Question No : 5)

Given:

~~X = no of dd~~

Y = difference b/w no of head & no of tails in 3 toss ces.

Required:

a) cdf of Y

b) mean & variance of Y = ?

Sol

(a) $S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$.

When there is head and tail is type difference use differ two

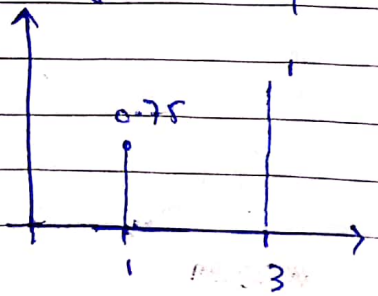
$x = 1 \quad S_1 \{HHT, HTH, THH, TTH, THT, TTH\}$

$x = 2 \quad S_2 \{HHH, TTT\}$

$S(S) < \{1, 3\}$

$P_X[1] = 6/8 = 3/4 = 0.75$

$P_X[3] = 2/8 = 1/4 = 0.25$



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(5) mean form:

$$\langle n \rangle_n = \sum x_k \cdot F_k(n)$$

$$= E[x]$$

$$E[x] = \sum_{x=0}^{\infty} x \cdot P_x(\,)(\,)$$

put value

$$E[x] = 1(0.75) + 3(0.25)$$

$$\boxed{E[x] = 1.5}$$

— xx — xx — xx — xx — xx

((Question NO : 6)

Given:

$$S_c = \{1, 2, 3, 4\}$$

c is uniform random variable.

W = power

$$W = 3c^2$$

Required:

Plot cdf of C & W.

P + T + 0

M□T□W□T□F□S H/W□-C/W□ Dated:...../...../20.....

Sol

$P_c[1] = \frac{1}{4} = 0.25$

$P_c[2] = 1/4 = 0.25$

$P_c[3] = 1/4 = 0.25$

$P_c[4] = 1/4 = 0.25$

$E[c] = \frac{1+2+3+4}{4} = 10/4 = 2.5$

Now

$VAR[c] = E[c^2] - E^2[c]$

$= 7.5 - 6.25$

$VAR[c] = 1.35$

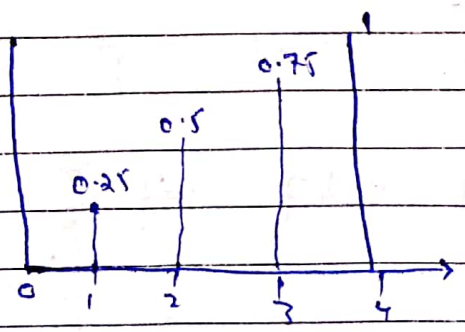
$k = 0 \quad P[0] = \leq 0$

$c = 1 \quad P[0] + P[1]$

$c = 2 \quad (c=1) + P[2]$

$c = 3 \quad (c=2) + P[3]$

$c = 4 \quad (c=3) + P[4]$



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$W = \{3, 12, 24, 48\}$

$P_W(3) = 1/4 = 0.25$

$P_W(12) = 1/4 = 0.25$

$P_W(24) = P_W(48) = 0.25$

As

$W = 3C_2$

$E[W] = E[3C_2]$

$= 3(7.5)$

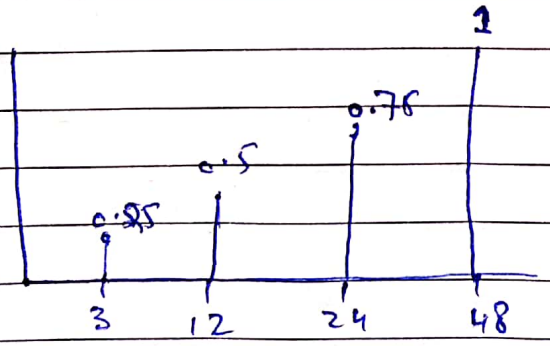
$E[W] = 22.5$

$E^2[W] = 506.25$

$E[W^2] = 796.5$

$VAR[W^2] = 796.5 - 506.25$

$VAR[W^2] = 290.25$



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