GATE
DATA SCIENCE AND AI

Probability & Statistics

Discrete Probability Distribution & Continuous Probability Distribution

DPP Discussion Notes

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Distributions
35 questions

Part 1 - 20 questions

{ Max/min
10 question } ⇒ Part 02

{ Order
Statistics }

DPP 03 - Part - one

Topic : Probability & Statistics

$\boxed{\text{Question 03}}$

#Q. Let X be a poison random variable and $P(X = 1) + 2P(X = 0) = 12$ $P(X = 2)$. Which one of the following statements is TRUE ?

A. $0.40 < P(X = 0) \leq 0.45$

B. $0.45 < P(X = 0) \leq 0.50$

C. $\boxed{0.50 < P(X = 0) \leq 0.55}$

D. $0.55 < P(X = 0) \leq 0.60$

$X \sim$ Poisson random variable

Parameter $= \lambda$

$P(X=1) + 2P(X=0) = 12P(X=2)$

We know that Poisson Distribution

$$P(X=r) = \frac{e^{-\lambda}\lambda^{r}}{r!}$$

$r =$ No. of success

$$P(X=1) + 2P(X=0) = 12P(X=2)$$

$$= \frac{e^{-\lambda}\lambda^1}{1!} + 2\frac{e^{-\lambda}\lambda^0}{0!} = 12\frac{e^{-\lambda}\lambda^2}{2!}$$

$$= e^{-\lambda}\lambda + 2e^{-\lambda} = 6e^{-\lambda}\lambda^2$$

$$= 6\lambda^2 e^{-\lambda} - 2e^{-\lambda} - \lambda e^{-\lambda} = 0$$

$$= e^{-\lambda}[6\lambda^2 - \lambda - 2] = 0$$

$$= 6\lambda^2 - \lambda - 2 = 0$$ — quardartic equ^n

$\lambda = \frac{2}{3}$ $\lambda = -\frac{1}{2}$

$$P[X=0] = \frac{e^{-\lambda}\lambda^0}{0!} = e^{-2/3} = \underline{0.51}$$

Poisson random variable

$\lambda > 0$ $\lambda = -\frac{1}{2}$ (rejected)

$\lambda = \frac{2}{3}$

mean of random vari

Parameter $\lambda = \frac{2}{3}$

$$\boxed{0.50 \le P(X=0) \le 0.55}$$

(C)

Topic : Probability & Statistics

#Q. A discrete random variable X has the following probability function mean $= \sum_{i=1}^{n} x_i p_i = 32$

variance $V(X) = \sum_{i=1}^{n} x_i^2 p_i - \left[\sum_{i=1}^{n} x_i p_i\right]^2 = 116$

μ_x = mean

σ_x = S.D.

x	:	10	20	30	40	50
y	:	0.1	0.1	0.4	0.3	0.1

Standard deviation = 10.77

Denote by μ_x and σ_x the mean and the standard deviation of X. Find $P(|X - \mu_x| \le \sigma_x)$.

A 1

$P[|(X-\mu_x)| \le \sigma_x]$

$= P[(x-\mu_x) \le \pm\sigma_x]$

B 0.8

C 0.7

D 0.5

$$P\left[|X-\mu_x| \le \sigma_x\right] = P\left[-\sigma_x \le X-\mu_x \le \sigma_x\right]$$

$\mu_x = 32$

$\sigma_x = 10.77$

$$= P\left[\mu_x-\sigma_x \le X \le \mu_x+\sigma_x\right]$$

$$= P\left[32-10.77 \le X \le 32+10.77\right]$$

$$= P\left[\boxed{\overset{30}{21.23}} \le X \le \boxed{\overset{40}{42.77}}\right]$$

$$= P(30) + P(40)$$

$$= 0.3 + 0.4$$

$$= 0.7 \text{ Ans}$$

B

Topic : Probability & Statistics

✓ max/min of random variables

#Q. X has a uniform distribution on the interval (0, 2), and $Y = \max\{X, 1\}$. Find $Var(Y)$.

A 0.05

B 0.10

C 0.15

D 0.20

Topic : Probability & Statistics

$X \sim P(\lambda) \rightarrow 2$

$\lambda = 2$

#Q. X has a Poisson distribution with a mean of 2. Y – geo( ) mean = 2

Y has a geometric distribution on the integers 0, 1, 2….., also with mean 2.

$f(x) = (1-p)^{k-1} p \quad x = 1, 2, 3 \ldots$

$f(x) = p(1-p)^k \quad x = 0, 1, 2, 3 \ldots$

X and Y are independent.

Find $\boxed{P(X = Y)}$

X — Poisson

Y — geometric

If X and Y Are Independent

$\underbrace{P[X=x]\,P[Y=y]}_{\text{multiple}}$

A. $\frac{e^{-2/3}}{3}$

B. $\frac{e^{-1/3}}{3}$

C. $\frac{1}{3}$

D. $\frac{e^{1/3}}{3}$

in given questions

If Y is geometric distribution

$$\boxed{f(y) = p(1-p)^k \quad k = 0, 1, 2, 3 \ldots}$$

$f(x) \to y$

y

mean mean $= E[X] = \dfrac{q}{p}$ var$(X) = \dfrac{1}{p^2}$

If geometric

$k = 1, 2 \ldots$

$$f(y) = p(1-p)^{k-1}$$

$E[X] = \dfrac{1}{p}$ $V(X) = \dfrac{1}{p^2}$

mean $= 2$

$\dfrac{q}{p} = 2$ $\dfrac{1-p}{p} = 2$ $\boxed{p = \dfrac{1}{3}}$

$P[Y = y]$

$f(y) = \dfrac{1}{3}\left(\dfrac{2}{3}\right)^y$ $y = 0, 1, 2, 3 \ldots$

$P[X = x]\, f(x) = \dfrac{e^{-2}(2)^x}{x!}$ $x = 0, 1, 2, 3 \ldots$

Poisson random variable

$P(X = r) = \dfrac{e^{-\lambda}\lambda^r}{r!}$ $\lambda = 2$

$\dfrac{e^{-2}(2)^r}{r!}$ = Poisson

If Poisson + geometric Random Variable both are indep.

$$\underbrace{P[X=x]}_{P(\lambda)}\ \underbrace{P[Y=y]}_{geo(p)} \Rightarrow \sum_{\substack{x=0\\y=0}}^{\infty} \frac{e^{-2}(2)^{x}}{x!}\cdot\frac{1}{3}\left(\frac{2}{3}\right)^{y}$$

$$= \frac{e^{-2}}{3}\sum_{\substack{x=0\\y=0}}^{\infty}\frac{(2)^{x}}{x!}\left(\frac{2}{3}\right)^{y}$$

$x=y$

$$= \frac{e^{-2}}{3}\sum_{x=0}^{\infty}\frac{2^{x}}{x!}\left(\frac{2}{3}\right)^{x}$$

$$= \frac{e^{-2}}{3}\sum_{x=0}^{\infty}\frac{\left(\frac{4}{3}\right)^{x}}{x!}$$

$$\Rightarrow \frac{e^{-2}}{3}e^{\frac{4}{3}}$$

$$= \frac{e^{\frac{-6+4}{3}}}{3}$$

$$= \frac{e^{-2/3}}{3}$$ (A)

Topic : Probability & Statistics

$\mu_X = 1$

$\sigma_X^2 = 4 \quad \sigma_X = 2$

#Q. If X has a normal distribution with mean 1 and variance 4, then $P[X^2 - 4X \le 0] = ?$

A. Less than 0.15

B. At least 0.15 but less than 0.35

C. At least 0.35 but less than 0.55

D. At least 0.55 but less than 0.75

$$P(X^2 - 4X \le 0) = P[(X^2 - 4X + 4 \le 4)$$
$$= P[(X-2)^2 \le 4)$$
$$= P(-2 \le X-2 \le 2)$$
$$= P(0 \le X \le 4)$$
$$= P\left(\frac{0-\mu}{\sigma} \le X \le \frac{4-1}{2}\right)$$
$$= P(-0.5 \le X \le 1.5)$$

Using Tables

$= D$

Topic : Probability & Statistics

$X \to \theta$

#Q. X has an exponential distribution with a mean of $\theta > 0$, where

$f(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}} \quad \theta \geq 0$

$$Y = \begin{cases} \frac{X}{2} \text{ if } X \leq \theta \\ X \text{ if } X > \theta \end{cases}$$

Find $E[Y]$.

Function of Random variable

A $\frac{\theta}{2}(1+e^{-1})$

B $\frac{\theta}{2}(1+2e^{-1})$

C $\frac{\theta}{2}(1-e^{-1})$

D $\frac{\theta}{2}(1-2e^{-1})$

$$Y = \begin{cases} \frac{X}{2} & X \le \theta \\ X & X > \theta \end{cases}$$

$$f(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}}$$

$$E[Y] = \int_0^{\theta} \frac{X}{2} \cdot \frac{1}{\theta} e^{-\frac{x}{\theta}} d\theta + \int_{\theta}^{\infty} X \cdot \frac{1}{\theta} e^{-\frac{x}{\theta}} d\theta$$

$$\boxed{E[Y] = \frac{\theta}{2}\left[2e^{-1}+1\right]}$$

(B)

Integrating Using Parts

EXPECTATATION

Function of random Variable

$$E[X] = \int_{-\infty}^{\infty} x f(x)\, dx \qquad f(x) = \lambda e^{-\lambda x}$$

$$\lambda = \frac{1}{\mu}$$

$$E[Y] = \int_{-\infty}^{\infty} Y f(x)\, dx$$

$$= \frac{1}{\mu} e^{-\frac{x}{\mu}}$$

$$X = g(x)$$

$$= \frac{1}{\theta} e^{-\frac{x}{\theta}}$$

$$E[g(x)] = \int_{-\infty}^{\infty} g(x) f(x)\, dx$$

Topic : Probability & Statistics

Do It

#Q. If X has exponential distribution with mean 2, then is $P(X < 1 \mid X < 2)$.

$f(x) = \frac{1}{\mu} e^{-\frac{x}{\mu}}$

$\mu = 2$

$P(X<1 / X<2) = P\left(\frac{X<1 \cap X<2}{P(X<2)}\right)$

$= \frac{1-e^{-0.5}}{1-e^{-1}}$

A $(1-e^{-2})/(1-e^{-4})$

B $(1-e^{-0.5})/(1-e^{-1})$

C $(1-e^{-1})/(1-e^{-2})$

D $(1-e^{-0.5})/(1-e^{-4})$

#Q. In a Poisson distribution, the probability of observing 3 is 2/3 times that of observing 4. The mean of the distribution is

Using Poisson Distribution

$P(X=r) = \frac{e^{-\lambda}\lambda^{r}}{r!}$ $r = 0, 1, 2, 3 \ldots$

$P(3) = \frac{2}{3} P(4)$

$\frac{e^{-\lambda}\lambda^{3}}{3!} = \frac{2}{3}\frac{e^{-\lambda}\lambda^{4}}{4!}$

$\frac{e^{-\lambda}\lambda^{3}}{3\times\cancel{2\times1}} = \frac{\cancel{2}}{3}\times\frac{e^{-\lambda}\lambda^{4}}{\cancel{4}_{2}\times\cancel{3}\times\cancel{1}}$

$6e^{-\lambda}\lambda^{3} = e^{-\lambda}\lambda^{4}$

A. 5

B. 6

C. 7

D. 8

$$6e^{-\lambda}\lambda^3 = e^{-\lambda}\lambda^4$$

$$e^{-\lambda}\lambda^4 - 6e^{-\lambda}\lambda^3 = 0$$

$$\lambda^3 e^{-\lambda}[\lambda - 6] = 0$$

$$\boxed{\lambda = 6}$$

mean of the distribution

$$\boxed{\lambda = 6}$$

#Q. The number of misprints per page of a book (X) follows the Poisson distribution such that $(X = 1) = P(X = 2)$. If the book contains 500 pages, the expected number of pages containing at most one misprint is

$\rightarrow \lambda$

$P(X=1) = P(X=2)$

$\frac{e^{-\lambda}\lambda^1}{1!} = \frac{e^{-\lambda}\lambda^2}{2!}$

$2e^{-\lambda}\lambda = \lambda^2 e^{-\lambda}$

$(2\lambda-\lambda^2)e^{-\lambda} = 0$

$(\lambda^2 = 2\lambda)e^{-\lambda} = 0$

$\lambda(\lambda-2)e^{-\lambda} = 2$

$\lambda = 2$ ✓ $\lambda = 0$ (reject)

A. $5005e^{-2}$

B. $10005e^{-2}$

C. $15000e^{-2}$ $15000e^{-2}$

D. $500(1 - 3e^{-2})$

(c)

$\lambda = 2$

$P(X \le 1) = P(X=0) + P(X=1)$

at most one Page.

$= \frac{e^{-\lambda}\lambda^0}{0!} + \frac{e^{-\lambda}\lambda^1}{1!}$

$= e^{-2} + 2e^{-2}$

$= \underline{3e^{-2}}$

How much Pages:

$= 500 \times 3e^{-2}$

$= \underline{1500e^{-2}}$

(C)

$\lambda = 3$

#Q. Security cameras in a railway reservation office indicate that the number of customers arriving before the opening of counters on any given day has the Poisson distribution with mean 3. The minimum number of counters it should open so that there is at least 90% chance of all the waiting customers being immediately served is

Minimum No. of counters $= 3$

A. 3

B. 4

C. 5

D. 6

$\lambda = 3$

$P[X=0] = \frac{e^{-\lambda}\lambda^0}{0!}$ $P(X=1) = \frac{e^{-\lambda}\lambda^1}{1!}$ $P(X=2) = \frac{e^{-\lambda}\lambda^2}{2!}$ $P(X=3) = \frac{e^{-\lambda}\lambda^3}{3!}$

$P[X=r] = \frac{e^{-\lambda}\lambda^r}{r!}$

$\underbrace{\frac{e^{-\lambda}\lambda^0}{0!} + \frac{e^{-\lambda}\lambda^1}{1!} + \frac{e^{-\lambda}\lambda^2}{2!} + \frac{e^{-\lambda}\lambda^3}{3!}} \geq \underline{0.90}$

$= \frac{e^{-3}(3)^0}{0!} + \frac{e^{-3}(3)^1}{1!} + \frac{e^{-3}(3)^2}{2!} + \frac{e^{-3}(3)^3}{3!} \geq \underline{0.98}$

0 counter
1 counter
2 counter
3 counter

$\underline{0.90}$

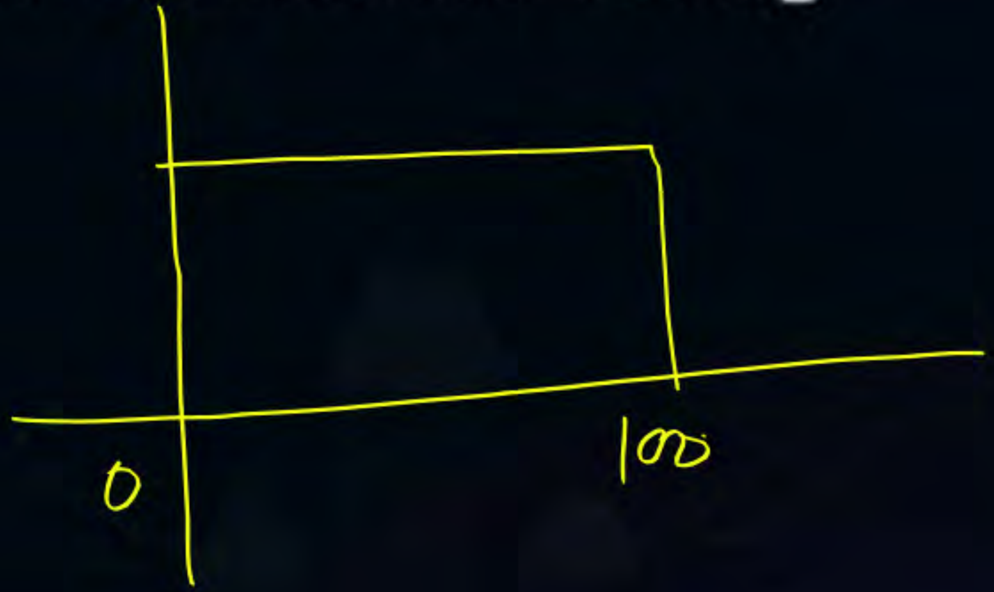
$N = 3$

$r = 3$

$\underline{0+1+2+3}$

Topic : Probability & Statistics

#Q. A thousand candidates appear for an examination. Their scores are independent and have a continuous uniform distribution over the range 0 to 100. The variance of the number of candidates having scores above 30 is



A. 210

B. 700

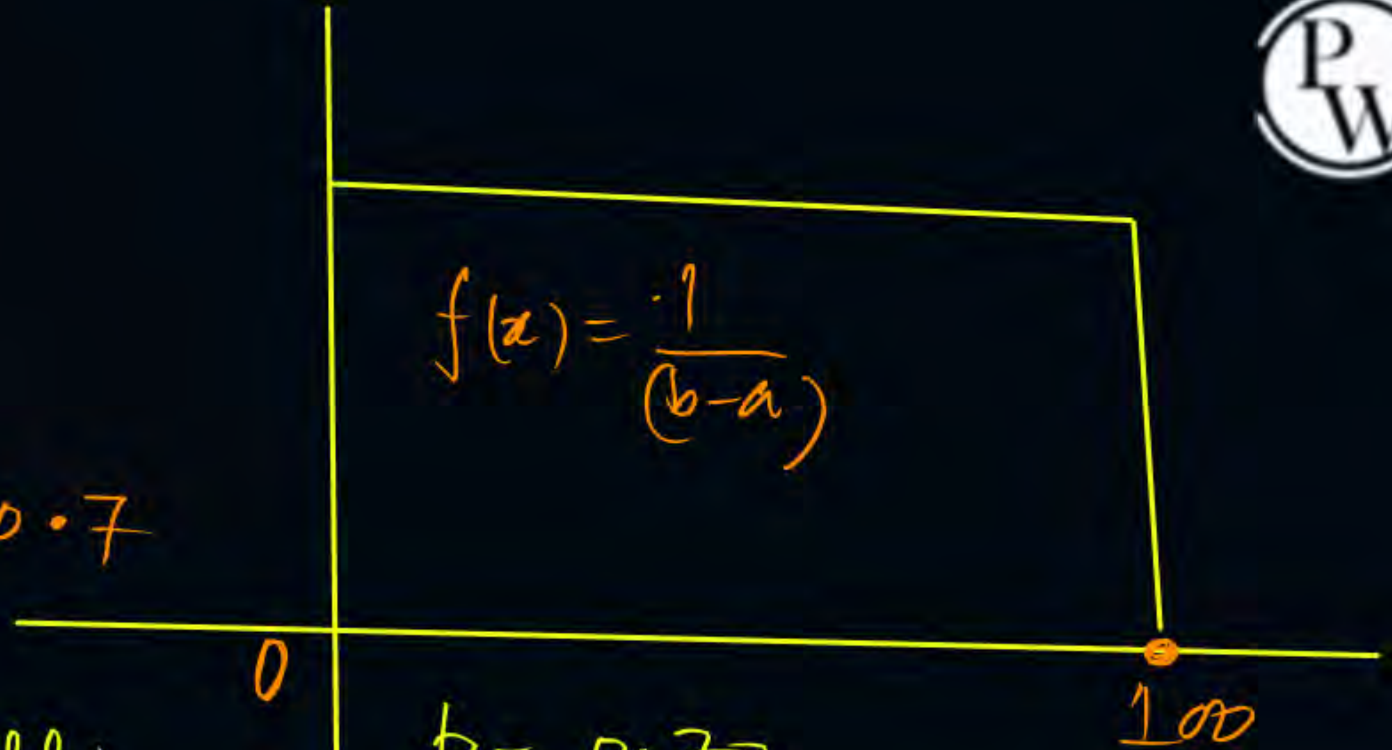
C. 25/3

D. 300

$$f(x) = \begin{cases} \dfrac{1}{100} & \overset{U}{[0, 100]} \\ 0 & \text{otherwise} \end{cases}$$

$$P(X > 30) = \int_{30}^{100} \frac{1}{100}\,dx = \frac{70}{100} = 0.7$$

$$\left.\begin{aligned} P(30 \text{ above}) &= 0.7 \\ P(\overline{30} \text{ above}) &= 0.3 \end{aligned}\right] \text{ Bernoulli Trials}$$



$p = 0.70$
$q = 0.30$

$$\text{variance} = npq \longrightarrow \text{binomial mean} = np$$

$$\text{var} = npq$$

$$= 1000 \times 0.7 \times 0.3$$

$$= 210 \text{ students}$$

A

Topic : Probability & Statistics

$X \sim N(\mu, \sigma^2)$

mean $= 1$ $\quad var(X) = 4$

$S.D = 2$

#Q. If X has a normal distribution with mean 1 and variance 4, then $P[X^2 - 2X \leq 8] = ?$

$P(X^2 - 2X \leq 8) = P((X^2 - 2X + 1) \leq 8 + 1)$

$= P((X-1)^2 \leq 9)$

$= P((X-1)^2 \leq 3^2)$

$\Rightarrow P[-3 \leq (X-1) \leq 3)$

$\Rightarrow P(-3+1 \leq X \leq 3+1)$

$= P(-2 \leq X \leq 4)$

$= P\left(\frac{-2-\mu}{\sigma} \leq Z \leq \frac{4-\mu}{\sigma}\right)$

$= P\left(\frac{-2-1}{2} \leq Z \leq \frac{3}{2}\right)$

$= P(-1.5 \leq Z \leq 1.5)$

Z SCORE

$= 0.86$

D

A 0.13

B 0.43

C 0.75

D 0.86

Topic : Probability & Statistics

$\underset{X_1}{\text{ʀ}}$ $\underset{X_2}{\text{ʀ}}$ $\underset{X_3}{\text{ʀ}}$

#Q. Three individuals are running a one kilometers race.
The completion time for each individual is a random variable. X_i is the completion time, in minutes, for person i.
X_1 : uniform distribution on the interval [2.9, 3.1] → Uniformly.
X_2 : uniform distribution on the interval [2.7, 3.1] → Uniformly.
X_3 : uniform distribution on the interval [2.9, 3.3] → Uniformly.
The three completion times are independent of one another.
Find the expected latest completion time (nearest .1).

A 2.9

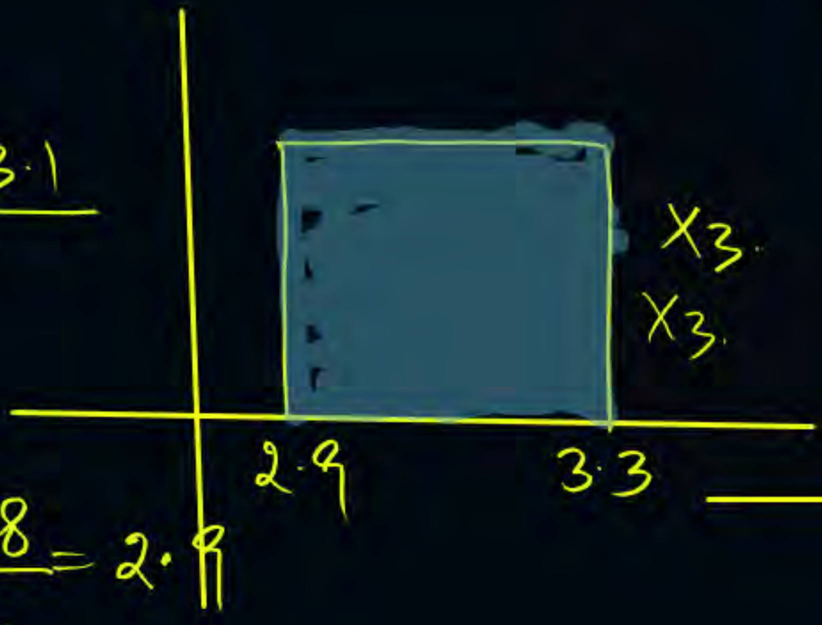
B 3.0

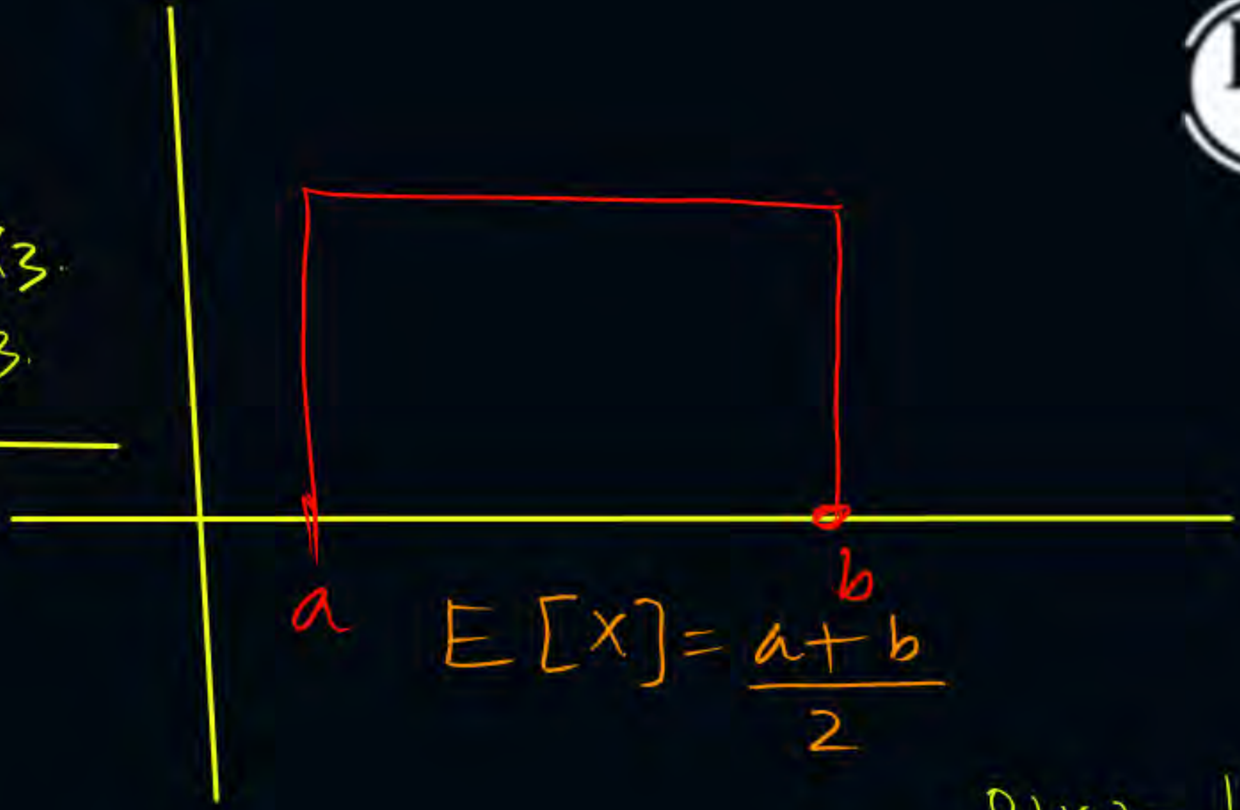
C 3.1

D 3.2

$$E[X_1] = \frac{a+b}{2} = \frac{2.9+3.1}{2}$$

$$E[X_1] = 3$$





$$E[X] = \frac{a+b}{2}$$

$$E[X_2] = \frac{2.7+3.1}{2} = \frac{5.8}{2} = 2.9$$

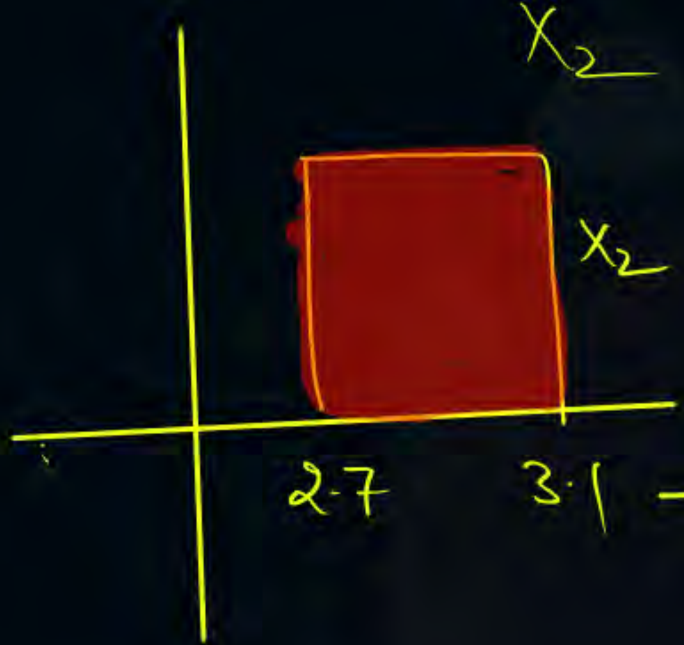
$$E[X_3] = \frac{2.9+3.3}{2} = \frac{6.2}{2} = 3.1$$

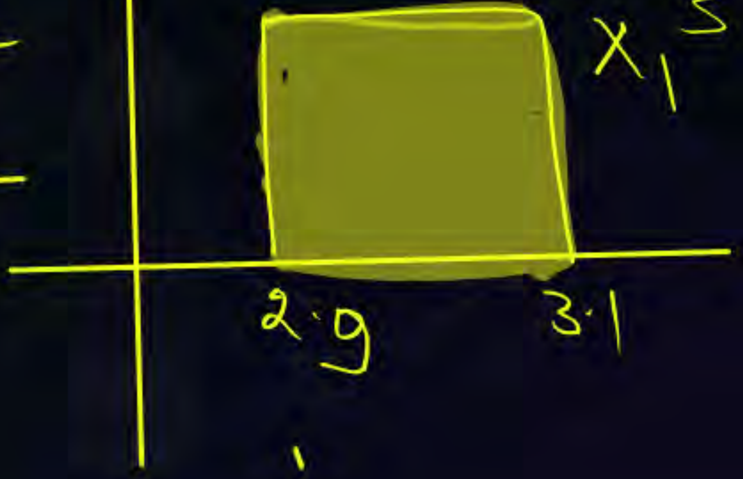
$P(X_1) = \frac{1}{3}$

$P(X_2) = \frac{1}{3}$

$P(X_3) = \frac{1}{3}$

Completion Time





$$E[X] = \frac{E[X_1] + E[X_2] + E[X_3]}{3}$$

$$= \frac{3+2.9+3.1}{3}$$

$$\boxed{E[X] = 3}$$

#Q. Customers arrive randomly and independently at a service window, and the time between arrivals as an exponential distribution with a mean of12 minutes. Let X equal the number of arrivals per hour. What is P[X = 10]?

$\lambda = 12$ min

$\mu = \frac{60}{12} = 5$

$P[X=10] = \frac{e^{-\lambda}\lambda^{r}}{r!}$

Poisson random variable

$= \frac{e^{-5}(5)^{10}}{10!}$

A $\frac{10e^{-12}}{10!}$

B $\frac{10^{-12}e^{-10}}{10!}$

C $\frac{12^{-10}e^{-10}}{10!}$

D $\frac{5^{10}e^{-5}}{10!}$

#Q. Which one of the following is not possible for a binomial distribution?

Do yourself

A Mean = 2, variance = $\frac{3}{2}$

B Mean = 5, variance = 9

C Mean = 10, variance = 5

D Mean = 4, variance = $\frac{8}{3}$

Topic : Probability & Statistics

#Q. A coin is twice as likely to turn up tails as heads. If the coin is tossed independently, what is the probability that the third head occurs on the fifth toss?

$P(H) = p$

$P(\text{Tail}) = 2p$

$p + 2p = 1$

$\boxed{p = \frac{1}{3}}$ $q = \frac{2}{3}$

Coin $<$ H, T

$\boxed{5^{th} \text{ Trial}}$

3 H

$\downarrow p = \frac{1}{3}$

$\Rightarrow {}^4C_2 \left(\frac{1}{3}\right)^2 \left(\frac{2}{3}\right)^{4-2}$

$= 6 \times \frac{1}{9} \times \frac{4}{9}$

$= \frac{24}{81} = \frac{8}{27}$

$= \frac{8}{27} \times \frac{1}{3} = \frac{8}{81}$

A. $\frac{8}{81}$ ✓

B. $\frac{40}{243}$

C. $\frac{16}{81}$

D. $\frac{80}{243}$

P(third HEAD in fifth Toss)

$P(\text{SUCCESS}) = \frac{1}{2}$ $P(F) = \frac{1}{2}$ $n = 4$

(No. of trials)

SUCCESS = 2

Using binomial Dist

$P(X=r) = {}^{n}C_r p^r q^{n-r}$

$P(X=2) = {}^{4}C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^{4-2}$

$= 6 \times \frac{1}{4} \times \frac{1}{4}$

$= \frac{6}{16} = \frac{3}{8}$

H H T T H

third HEAD

$= \frac{1}{2}$ ✓

$= \frac{3}{8} \times \frac{1}{2} = \frac{3}{16}$

Topic : Probability & Statistics

$E[x] = \frac{a+b}{2}$

$V(x) = \frac{(b-a)^2}{12}$

#Q. Let X be a random variable with a continuous uniform distribution on the interval (1, α), Where α > 1. If E [X] = 6. Var[X], then α =

$\boxed{\text{Parameter } \alpha = 3}$

$E[x] = 6\,V(x)$

$\frac{\alpha+1}{2} = \cancel{6}\,\frac{(\alpha-1)^2}{\cancel{12}\,2}$

$\frac{\alpha+1}{\cancel{2}} = \frac{(\alpha-1)^2}{\cancel{2}}$

$\alpha+1 = \alpha^2+1-2\alpha$

$\alpha+3\alpha+1-1-\alpha^2 = 0$

$\alpha^2-3\alpha = 0$

$\alpha(\alpha-3) = 0$

$\alpha = 0$

$\alpha = 3$

A 2

B 3

C 4

D 7

H.W

#Q. Suppose that X has uniform distribution on the interval $[0, 100]$. Let Y denote the greatest integer smaller than or equal to X. Which of the following is true?

A $P(Y \leq 25) = \frac{1}{4}$

B $P(Y \leq 25) = \frac{26}{100}$

C $E(Y) = 50$

D $E(Y) = \frac{101}{2}$

Topic : Probability & Statistics

#Q. Let X be a Geom (0.4) random variable. Then $P(X = 5 \mid X \geq 2)$ equals____.

X is geometric random variable

$p = 0.4$

X is geometric Random variable

$f(x) = (1-p)^k p \quad k = 0, 1, 2, 3 \ldots$

$$\boxed{\underset{P(X=r)}{f(x)} = (1-p)^{k-1} p \quad k = 1, 2, 3 \ldots}$$

$P(X=1) = (1-p)^0 \cdot p$

$P(X=5 / X \geq 2)$

$$= \frac{P(X=5 \cap X \geq 2)}{P(X \geq 2)}$$

$$= \frac{P(X=5)}{1 - P(X=1)}$$

$$= \frac{(1-p)^4 \cdot p}{1 - 0.4} = \frac{(0.6)^4 \cdot (0.4)}{(0.6)} = 0.0864$$

$= 0.4 \times (0.6)^3$

Ans

#Q. Let X be a $B\,in(2, p)$ random variable, and Y be a $Bin(4, p)$, $0 < p < 1$.

If $P(X \geq 1) = \frac{5}{9}$, then $P(Y \geq 1) =$ $\frac{65}{81}$.

$X \longrightarrow (2, p)$ $0<p<1$

$Y \longrightarrow (4, p)$

$P(Y \geq 1)$

$P(X \geq 1) = \frac{5}{9}$

$\boxed{p = \frac{1}{3} \quad q = \frac{2}{3}}$

$P(X \geq 1) = 1 - P(X=0) = \frac{5}{9}$

$P(X=0) = \frac{4}{9}$

$= {}^nC_0\, p^0 q^{n-0} = \frac{4}{9}$

$= q^n = \frac{4}{9}$

$B(2, p)$

$\underline{n=2}$

$= q^2 = \frac{4}{9}$ $\boxed{q = \frac{2}{3}}$ $\boxed{p = 1 - \frac{2}{3} = \frac{1}{3}}$

$P(X \geq 1) = 1 - P(X=0)$ $\quad n=4 \quad X = B(4, p)$

$\underline{n=4}$

$= 1 - \left[{}^nC_0\, p^0\, q^{n-0}\right]$

$= 1 - \left[q^n\right] = 1 - (1-p)^n = 1 - \left(1 - \frac{1}{3}\right)^4 = 1 - \left(\frac{2}{3}\right)^4$

$= 1 - \frac{16}{81}$

$= \frac{65}{81}$

Topic : Probability & Statistics

#Q. Let X be a random variable with the probability density function

$$f(x|r,\lambda) = \frac{\lambda^r}{(r-1)!} x^{r-1} e^{-\lambda x}, x > 0, \lambda > 0, r > 0.$$

— gamma Distribution

mean $= \frac{r}{\lambda}$

variance $\frac{r}{\lambda^2}$

If $E(X) = 2$ and $Var(X) = 2$, then $P(X < 1)$ equals ________.

$\frac{r}{\lambda} = 2 \qquad \frac{r}{\lambda^2} = 2$

$r = 2$

$\lambda = 1$

$$P(X<1) = \int_0^1 \frac{1^2}{1!} x^{2-1} e^{-x} dx$$

$$= \int_0^1 x e^{-x} dx$$

Ans

THANK - YOU

Topics to be covered