

Mathematical Foundations for Data Science

**BITS Pilani**  
PILANI CAMPUS

Virtual Classroom

Chat Participants (72)

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Sunay Kumar Jha  
Is Audio visual Available?

There is blank screen for me

Sukhdeep Mitra  
no in files section only 6-7th Nov slides are present

thank you

Jitesh Pal  
can you show where it is available

we dont see anything

ADITHA PABASARA RAJAKARUNA JOINED

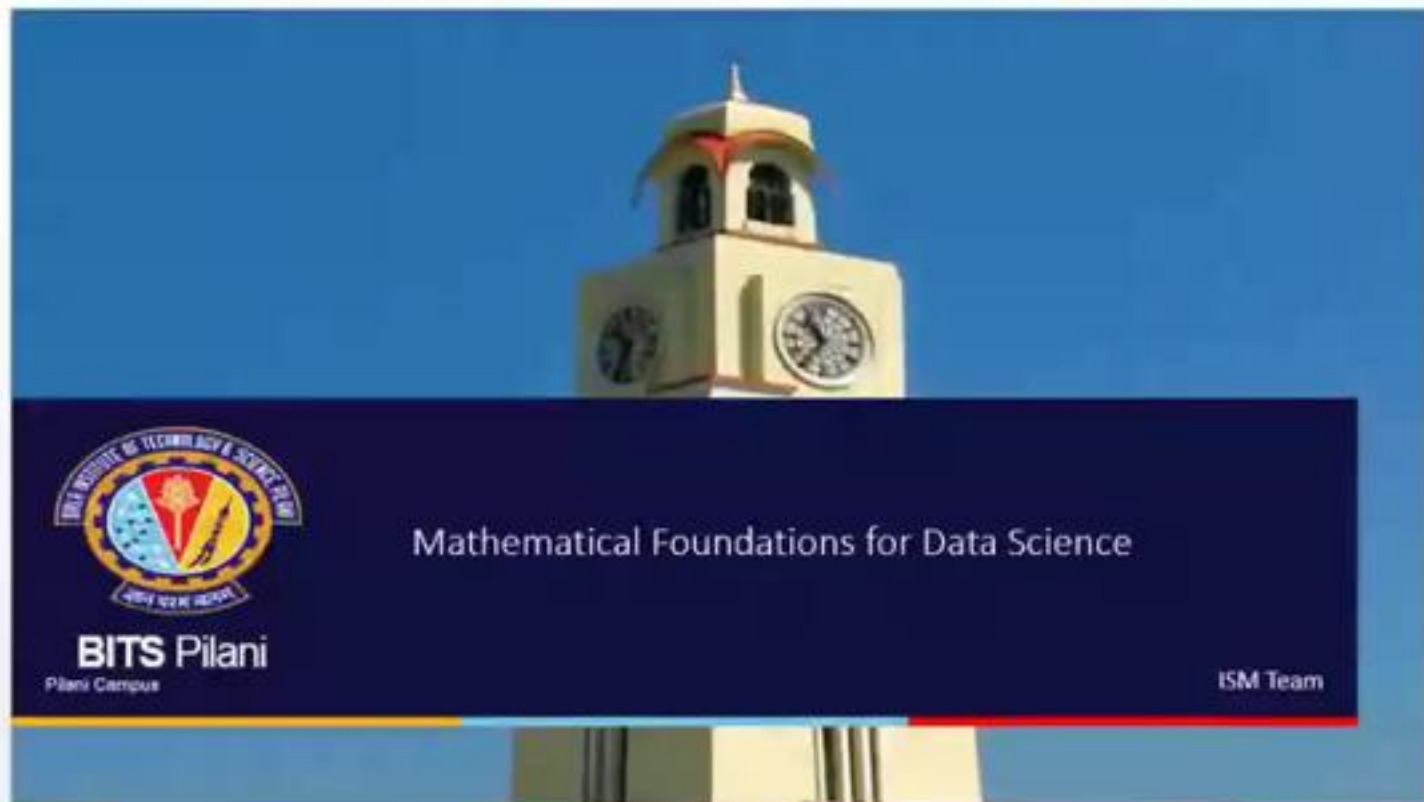
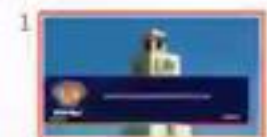
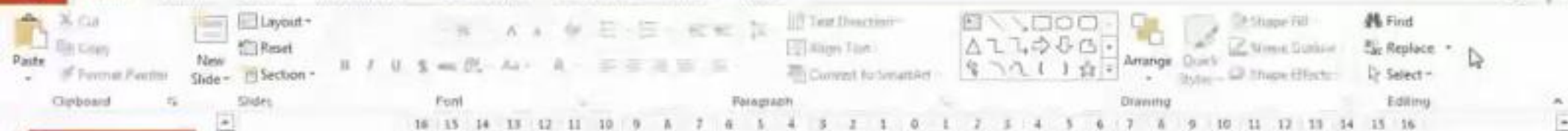
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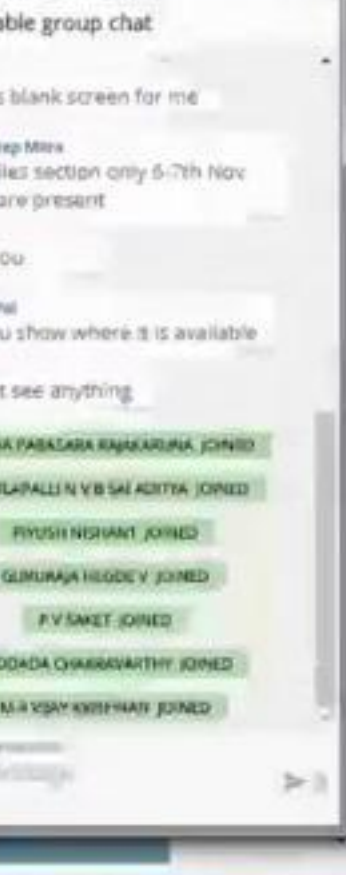
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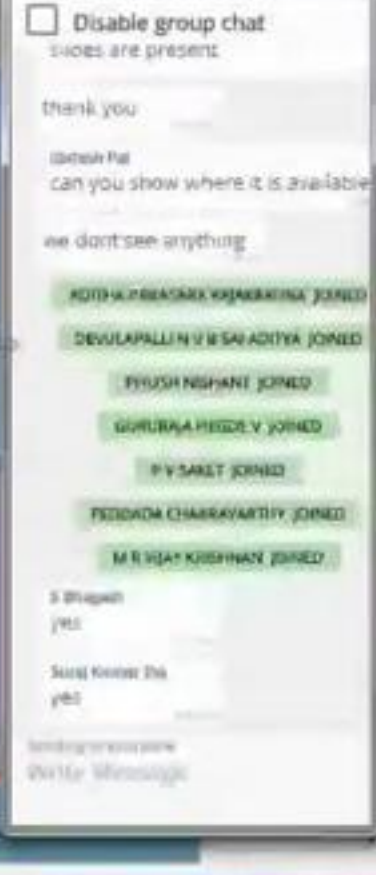
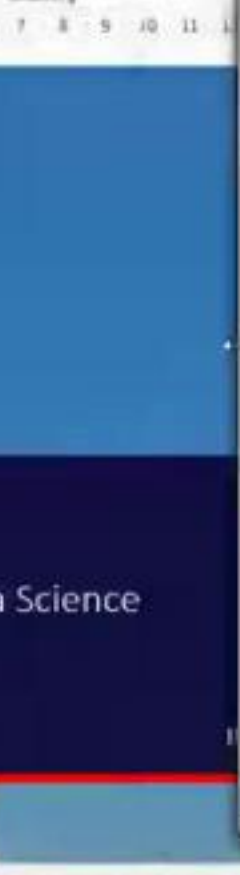
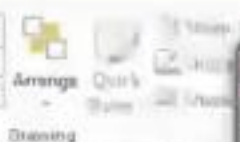
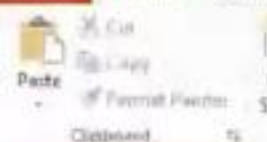
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Plant Carnivore





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GURURAJA HIRDE V JOINED

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PRADYUMN CHAKRABARTI V JOINED

M R VIJAY KISHAN V JOINED

S Bhagwan  
yes

Suresh Kumar Dha  
yes

Send message

FILE HOME INSERT DESIGN TRANSITIONS ANIMATIONS SLIDE SHOW REVIEW VIEW

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Sending to everyone

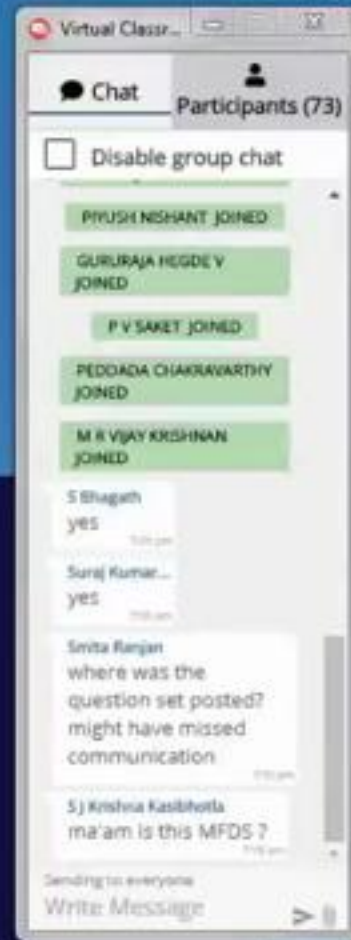
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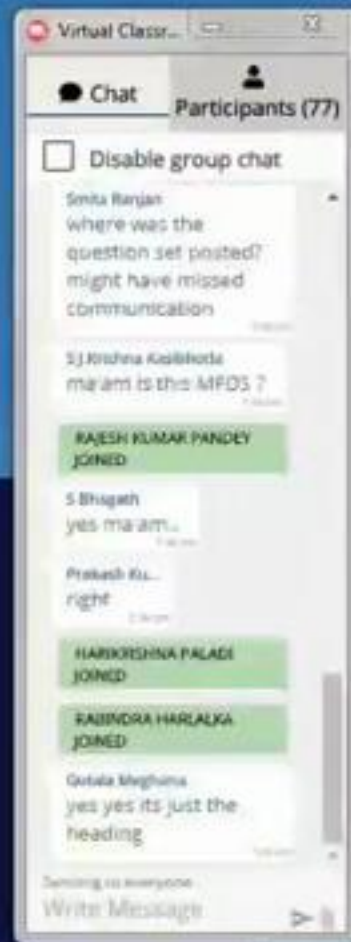
## Mathematical Foundations for Data Science





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## Mathematical Foundations for Data Science

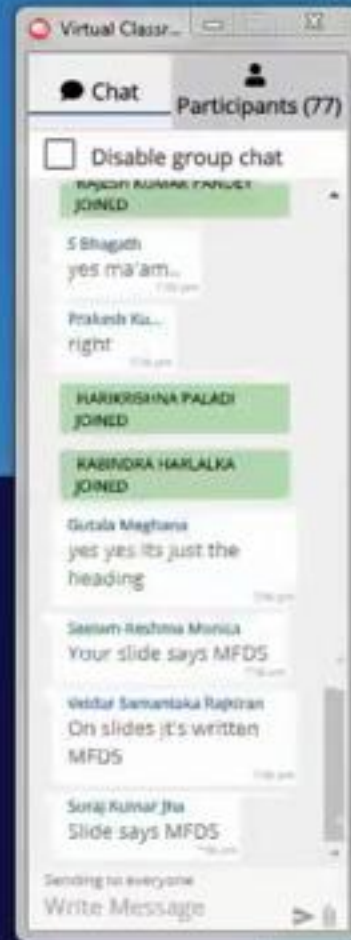






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## Mathematical Foundations for Data Science





BR  
Pillani Car

# INTRODUCTION TO STATISTICAL METHODS

WEBINAR 4 : 07.12.2021

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HARISHNA PALADI JOINED

RABINDRA HARALKA JOINED

Gutale Meghana  
yes yes its just the heading

Seelan Kethira Monica  
Your slide says MFDS

Vedur Samantaka Rajoran  
On slides it's written MFDS

Sang Rana Jha  
Slide says MFDS

NEERAJ SABHINANI JOINED

Gurukulam R  
The slide shows MFDS

Write Message



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# INTRODUCTION TO STATISTICAL METHODS

WEBINAR 4 : 07.12.2021

Virtual Classi...

Chat Participants (79)

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RABINDRA HARLAKA JOINED

Gutala Meghana  
yes yes its just the heading 11:50 am

Seelan Reshma Monica  
Your slide says MFDS 11:50 am

Veldur Samantaka Rajkiran  
On slides it's written MFDS 11:50 am

Suraj Kumar Jha  
Slide says MFDS 11:50 am

NEERAJ SAGINANI JOINED

Gunsalekaran B  
The slide shows MFDS 11:50 am

Suraj Kumar...  
yes 11:50 am

GAURAV ANAND JOINED

Sending to everyone  
Write Message



# WEBINAR 2

- Random Variables
- Joint Distribution
- Family of Random Variables



# WEBINAR 2

- Random Variables
- Joint Distribution
- Family of Random Variables



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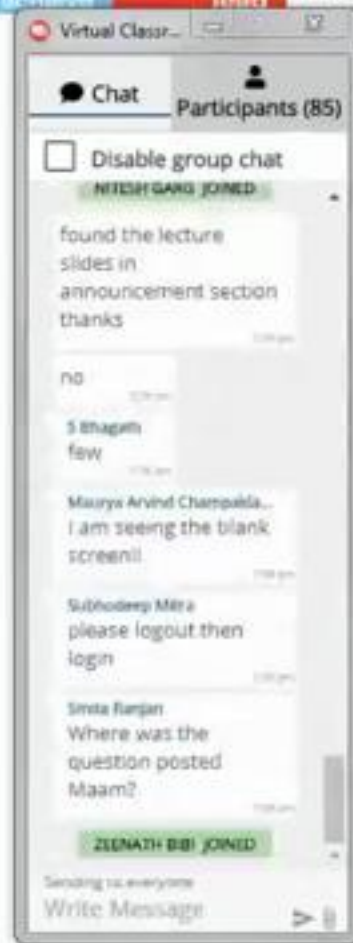
- Random Variables
- Joint Distribution
- Family of Random Variables





# WEBINAR 2

- Random Variables
- Joint Distribution
- Family of Random Variables



# WEBINAR 2

- Random Variables  $f: S \rightarrow R$
- Joint Distribution
- Family of Random Variables



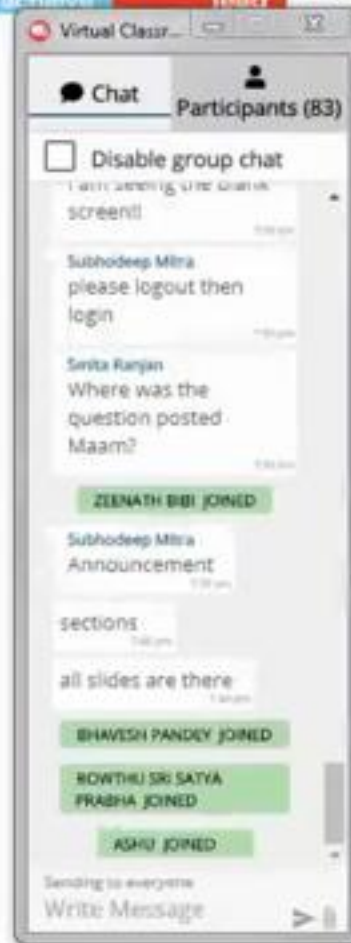
# WEBINAR 2

▪ Random Variables  $f: S \rightarrow R$



▪ Joint Distribution

▪ Family of Random Variables



# WEBINAR 2

▪ Random Variables  $f: S \rightarrow R$



▪ Joint Distribution

▪ Family of Random Variables

Virtual Classr...

Chat Participants (84)

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Subhodeep Mitra  
please logout then login  
11:36 am

Sirita Ranjan  
Where was the question posted Maam?  
11:36 am

ZZENATH BIBI JOINED

Subhodeep Mitra  
Announcement  
11:36 am

SECTIONS  
11:36 am

all slides are there  
11:36 am

BHAVESH PANDEY JOINED

ROWTHU SRI SATYA PRABHA JOINED

ASHU JOINED

DIVESH CHADHA JOINED

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# WEBINAR 2

1. Check whether the following can serve as probability distributions:

a.  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

b.  $f(x) = \begin{cases} 2e^{-2x}; & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$



# WEBINAR 2

1. Check whether the following can serve as probability distributions: →

a.  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

b.  $f(x) = \begin{cases} 2e^{-2x}; & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$



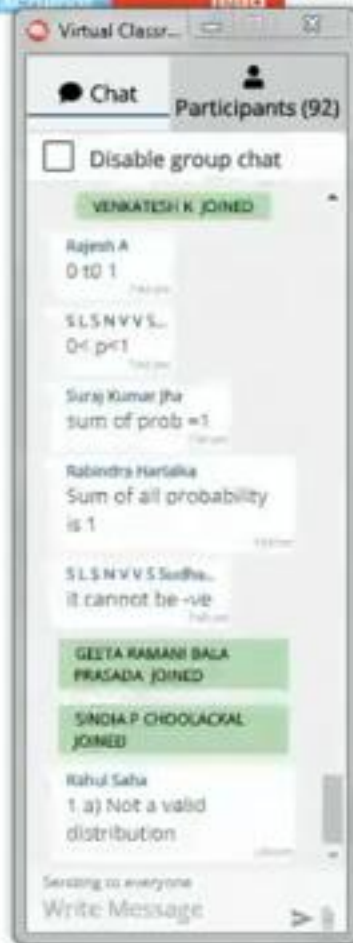
# WEBINAR 2

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

✓ b  $f(x) = \begin{cases} 2e^{-2x}; & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$



# WEBINAR 2

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob

$x=1, f(1) = -\frac{1}{2} (-ve)$

✓ b  $f(x) = \begin{cases} 2e^{-2x}; & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

1.  $f(x) \geq 0$  for every  $x \geq 0$

→ Valid

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SLSNVVS... valid

Prakash Ku... valid

S Shagath valid

Urvika jagat... Yes

SAMULYA SREE JOINED

ALOK KUMAR JHA JOINED

S Shagath integration 0 to inf

Bhavesh Pa... b is valid

ARAVIND P. JOINED

SHRINATH VENKATARAMANA RAO JOINED

Sending to everyone

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# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$



1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob

$x=1, f(1) = -\frac{1}{2} (-ve)$

✓ b  $f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

→ Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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



# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$



1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob  $x=1, f(1) = -\frac{1}{2}$  (-ve)

✓ b  $f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

→ Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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

$\int_0^{\infty} 2e^{-2x} dx = \int$



# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$



1. Check whether the following can serve as probability distributions:

→ Prob

a.  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob  $x=1, f(1) = -\frac{1}{2}$  (-ve)

b.  $f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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

$\int_0^{\infty} 2e^{-2x} dx = \int_0^{\infty} 2e^{-x} dx$



# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

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→ Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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

$\int_0^{\infty} 2e^{-2x} dx = \left[ -\frac{2e^{-2x}}{2} \right]_0^{\infty} = 1$

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MANURAJ BHARALI JOINED

Bhimen Joshi  
x = 0, f(x) = 2?

M R Vijay Kris...  
sorry x=0

2nd one

Bhimen Joshi  
D...

HIMALI AGARWAL JOINED

Rabindra Haralka  
For x = 0, f(x) = 2, how is that valid?

Seelan Reshma Monica  
in b, for x=0, f(x) becomes 2 which is greater than 1, so its not valid

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# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$

1. Check whether the following can serve as probability distributions:

a.  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob

→ Prob

$x=1, f(1) = -\frac{1}{2}$  (-ve)

b.  $f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$

Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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

$$\int_0^{\infty} 2e^{-2x} dx = \left[ -\frac{2e^{-2x}}{2} \right]_0^{\infty} = 1$$

$$[-e^{-2x}]_0^{\infty} = 1$$

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problem b

Bhimsen Joshi  
For b... is it ok if  $f(0) = 2$ ???

S Bhagath  
 $f(x) \geq 0$ , not between 0 & 1..

Bhavesb Pandey  
then also it will be greater than 1

GIRIDHARY KUMAR  
TAMULI JOINED

Rahul Saha  
b) is invalid

Raghavendr...  
it is -1

S Bhagath  
0-(-1)

SARAVANAN J JOINED

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# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

Not valid prob

$x=1, f(1) = -\frac{1}{2}$  (-ve)

✓ b  $f(x) = \begin{cases} 2e^{-2x} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$   $\geq 0 > 0$

→ Valid

1.  $f(x) \geq 0$  for every  $x \geq 0$

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

$\int_0^{\infty} 2e^{-2x} dx = \left[ \frac{2e^{-2x}}{-2} \right]_0^{\infty} = 1$

$[-e^{-2x}]_0^{\infty} = 1$

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0 (-1)

SARAVANAN J JOINED

SANDIP SARKAR JOINED

M R Vijay Kr...  
yes

Bhraman Joshi  
Problem b seems to be invalid

SEELAM RISHMA MONICA JOINED

KARTHIK P JOINED

GUTALA MEGHANA JOINED

AGASTYA RAMANI  
KRISHNA KUMAR JOINED

SLS N VVS SUDHAKAR JOINED

For b it is 2

Sending to everyone  
Write Message

# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

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$[-e^{-2x}]_0^{\infty} = 1$

Note:

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SARAVANAN J JOINED

SANDIP SARKAR JOINED

M R Vijay Kil...  
yes

Brimsen Joshi  
Problem b seems to be invalid

SEELAM RESHMA MONICA JOINED

KARTHIK P JOINED

GLTALA MELGHANA JOINED

AGASTYA RAMANI  
KRISHNA KUMARI JOINED

SLS NV V S SUDHAKAR JOINED

For D it is 2

How is it possible?

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# WEBINAR 2

Discrete - Sum  
Continuous -  $\int$

1. Check whether the following can serve as probability distributions:

→ Prob

✓ a  $f(x) = \frac{x-2}{2}; x=1,2,3,4$

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$[-e^{-2x}]_0^{\infty} = 1$

Note:

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SANDIP SARKAR JOINED

M R Vijay Krt...  
yes

Bhimen Joshi  
Problem b seems to be invalid

SEELEAM RISHMA MONICA JOINED

KARTHIK P JOINED

GUTALA MEGHANA JOINED

AGASTYA RAMANI  
KRISHNA KUMAR JOINED

S L S N V S SUDHAKAR JOINED

For 0 it is 2

How is it possible?

AMOGH SINGHAL JOINED

Sending to everyone  
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# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{with } k = 2$$

- Is it a valid distribution? Justify. If valid then find the following
- $P(x > 2)$
- $P(1 < x < 3)$





# WEBINAR 2

2. A random variable X is having probability distribution function is given by

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# WEBINAR 2

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# WEBINAR 2

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$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{with } k = 2$$

$$\frac{e^{-\lambda} \lambda^x}{x!}$$

- Is it a valid distribution? Justify. If valid then find the following
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# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{with } k = 2$$

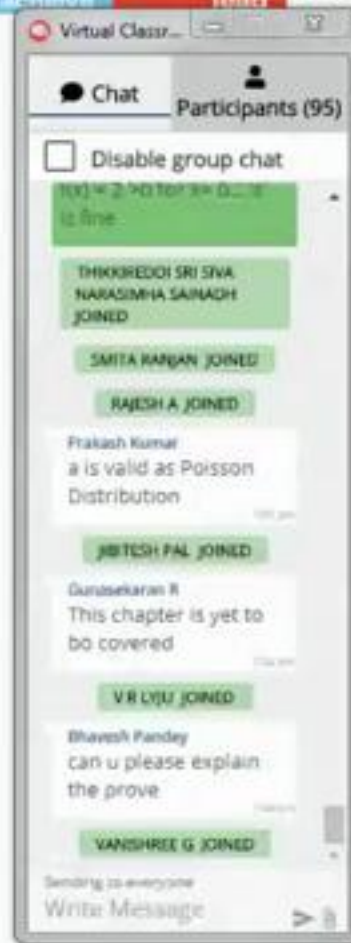
$$\frac{e^{-\lambda} \lambda^x}{x!}$$

a. Is it a valid distribution? Justify. If valid then find the following

b.  $P(x > 2)$

c.  $P(1 < x < 3)$

(i)  $f(x) \geq 0$   
(ii)  $\sum_{x=0}^{\infty} \frac{e^{-2} 2^x}{x!} = e^{-2} \sum_{x=0}^{\infty} \frac{2^x}{x!} = e^{-2} e^2 = 1$



# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{with } k = 2$$

$$\frac{e^{-\lambda} \lambda^x}{x!}$$

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(i)  $f(x) \geq 0$

(ii)  $\sum_{x=0}^{\infty} \frac{e^{-2} 2^x}{x!} = \frac{e^{-2} 2^0}{0!} + e^{-2}$

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THIRUDEVI SRI SIVA NARASIMHA SAINADH JOINED

SMITA RANJAN JOINED

RAJESH A JOINED

Prakash Kumar  
a is valid as Poisson Distribution

JYOTISH PAL JOINED

Gunasekaran R  
This chapter is yet to be covered

V R LYSU JOINED

Bhavesh Pandey  
can u please explain the prove

VANISHREE G JOINED

Gunasekaran R  
Why x! instead of 2!

Sending to everyone

Write Message



# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

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 $= e^{-2}$

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Prakash Kumar  
a is valid as Poisson Distribution

JBITESH PAL JOINED

Gurusekaran R  
This chapter is yet to be covered

VR LNU JOINED

Bhuresh Pandey  
can u please explain the prove

KANISHK G JOINED

Gurusekaran R  
Why x! instead of 2!

Geeta Ramesh Ba.  
k=2 and not x

Gurusekaran...  
Yes mam

Sending to everyone  
Write Message

# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

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$$= e^{-2} \left[ 1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots \right] = e^{-2} [e^2] = 1$$

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JAYESH PAL JOINED

Guneskaran R  
This chapter is yet to be covered

VR LUVU JOINED

Bhaves Pandey  
can u please explain the prove

VANISHREE G JOINED

Guneskaran R  
Why x! instead of 2!

Geeta Ramani BA...  
k=2 and not x

Guneskara...  
Yes mam

S Bhagath  
e^2

HAREESH V JOINED

Sending to everyone  
Write Message

# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

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$$= e^{-2} \left[ 1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots \right] = e^{-2} (e^2) = 1$$

Valid.

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This chapter is yet to be covered

V R LUYU JOINED

Bhuvish Pandey  
can u please explain the prove

VANISHREE G JOINED

Gurudevkar R  
Why xi instead of 2i

Geeta Ramani Ba.  
k=2 and not x

Gurudevkar...  
Yes mam

S Bhugath  
e^-2

HAREESH S V JOINED

MALAY DAS SHARMA JOINED

Sending to everyone

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# WEBINAR 2

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

a. Is it a valid distribution? Justify. If valid then find the following

b.  $P(x > 2)$

c.  $P(1 < x < 3)$

✓ a)  $P(x > 2) = P(x = 3, 4, \dots)$

= .

Valid.

$$\begin{aligned} \text{(i)} \quad f(x) &> 0 \\ \text{(ii)} \quad \sum_{x=0}^{\infty} \frac{e^{-2} 2^x}{x!} &= \frac{e^{-2} 2^0}{0!} + \frac{e^{-2} 2^1}{1!} + \frac{e^{-2} 2^2}{2!} + \dots \\ &= e^{-2} \left[ 1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots \right] = e^{-2} (e^2) = 1 \end{aligned}$$

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VANSHREED G. JOINED

Gurusekaran B.  
Why x! instead of 2!

Geta Ramani B...  
k=2 and not x!

Gurusekara...  
Yes mam

S Bhagath  
e^2

HARSH S V JOINED

MALAY DAS SHARMA JOINED

Prakash Kumar  
b.  $1 - p(x \leq 2)$

Anagh Singhal  
will these properties and series sums will be provided as part of question?

Sending to everyone  
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# WEBINAR 2

$e^x$

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

a. Is it a valid distribution? Justify. If valid then find the following

b.  $P(x > 2)$

c.  $P(1 < x < 3)$

✓ a)  $P(x > 2) = P(x = 3, 4, \dots)$

=

(i)  $f(x) \geq 0$

$$\begin{aligned} \text{(ii)} \quad \sum_{x=0}^{\infty} \frac{e^{-2} 2^x}{x!} &= \frac{e^{-2} 2^0}{0!} + \frac{e^{-2} 2^1}{1!} + \frac{e^{-2} 2^2}{2!} + \dots \\ &= e^{-2} \left[ 1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots \right] = e^{-2} (e^2) = 1 \end{aligned}$$

Valid.

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Yes mam

S Bhagati  
e^2

HAREESH V JOINED

MALAY DAS SHARMA JOINED

Prakash Kumar  
b.  $1 - p(x \leq 2)$

Amogh Singhal  
will these properties and series sums will be provided as part of question?

S Bhagati  
 $1 - p(x = 0, 1, 2)$

Piyush Nishant  
use integration (Definite)

SENTHIL K JOINED

Sending to everyone

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# WEBINAR 2

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \dots$$

2. A random variable X is having probability distribution function is given by

$$f(x) = \frac{e^{-k} k^x}{x!}, x = 0, 1, 2, 3, \dots \text{ with } k = 2$$

$$\frac{e^{-\lambda} \lambda^x}{x!}$$

a. Is it a valid distribution? Justify. If valid then find the following

b.  $P(x > 2)$

c.  $P(1 < x < 3)$

$$\begin{aligned} \checkmark a) P(x > 2) &= P(x = 3, 4, \dots) \\ &= 1 - P(x \leq 2) \end{aligned}$$

(i)  $f(x) \geq 0$

$$(ii) \sum_{x=0}^{\infty} \frac{e^{-2} 2^x}{x!} = \frac{e^{-2} 2^0}{0!} + \frac{e^{-2} 2^1}{1!} + \frac{e^{-2} 2^2}{2!} + \dots$$

$$= e^{-2} \left[ 1 + \frac{2}{1!} + \frac{2^2}{2!} + \frac{2^3}{3!} + \dots \right] = e^{-2} (e^2) = 1$$

Valid.

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Amogh Singhal  
will these properties and series sums will be provided as part of question?

S Bhagath  
1- p(x=0,1,2)

Piyush Nishant  
use integration (Definite)

SENTHIL K JOINED

and limit is 2 to infinity.

Amogh Singhal  
ok mam, thanks

Piyush Nishant  
Ok Thanks

SHENDU PRETHADINATH JOINED

Sending to every one

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## WEBINAR 2

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \leq x < 3 \\ .40 & 3 \leq x < 4 \\ .45 & 4 \leq x < 6 \\ .60 & 6 \leq x < 12 \\ 1 & 12 \leq x \end{cases}$$

- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(X)$  and Variance of  $X$ .



# WEBINAR 2

Cumulative- till

$$\underline{f(x)} \quad \underline{p(x)} \quad \underline{p(x=x)} \quad \underline{p(x=a)}$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

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$$F(x) =$$

- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(X)$  and Variance of  $X$ .

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Integration of pdf till given point is cdf

Agastya Ramani Krishna R...  
P(X=x) = area of the graph

LIME HARSA JOINED

Sriha Ranjan  
yes

S Bhagath  
in interest

Seelam Resh...  
its upto x

Vivek Singh  
add all prob till that point

K GIRISH GOPINATHAN  
JOINED

Sending to everyone  
Write Message

# WEBINAR 2

Cumulative- till

$$\underline{f(x)} \quad \underline{p(x)} \quad \underline{p(x=x)} \quad \underline{p(x=a)}$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

$$F(x) = P[X \leq x]$$

$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \leq x < 3 \\ .40 & 3 \leq x < 4 \\ .45 & 4 \leq x < 6 \\ .60 & 6 \leq x < 12 \\ 1 & 12 \leq x \end{cases}$$

- a. What is the PMF of  $X$ ?  
b. Compute  $P(3 \leq X \leq 6)$   
c. Obtain  $E(X)$  and Variance of  $X$ .

PMF - discrete  
PDF





# WEBINAR 2

Cumulative - till

$$f(x) \quad \frac{p(x)}{p(x=x)} \quad p(x=a)$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

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$$F(x) = P[X \leq x]$$

$$X = 1, 3, 4, 6, 12$$

- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(X)$  and Variance of  $X$ .

PMF - discrete

PDF - continuous





# WEBINAR 2

Cumulative - till

$$f(x) \quad \frac{p(x)}{p(x=x)} \quad \text{pro} \quad p(x=x)$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

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- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(X)$  and Variance of  $X$ .

PMF - discrete

PDF - continuous

$$F(x) = P[X \leq x]$$

$X = 1, 3, 4, 6, 12$



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Srita Kanjan continuous

Prakash Kumar pmf discrete and PDF in Contin

Suraj Kumar... f(x)=f(x-1)

PARTHASARATHY K JOINED

S Bhagath 1,3,4,6,12

AAKASHA JAIN JOINED

SAI KUMAR K C JOINED

RAKESH T JOINED

DASADIVA VISHVDEEP MANISHBHAI JOINED

SWAPNA K JOSEPH JOINED

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# WEBINAR 2

cumulative - till

$$f(x) \quad \frac{p(x)}{p(x=x)} \quad \frac{p(x)}{p(x=a)}$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

non-decreasing

$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \leq x < 3 \\ .40 & 3 \leq x < 4 \\ .45 & 4 \leq x < 6 \\ .60 & 6 \leq x < 12 \\ 1 & 12 \leq x \end{cases}$$

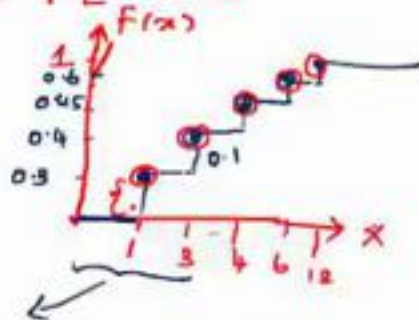
- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(X)$  and Variance of  $X$ .

PMF - discrete

PDF - continuous

$$F(x) = P[X \leq x]$$

$X = 1, 3, 4, 6, 12$



$$f(x) = \begin{cases} x=1 \end{cases}$$

Virtual Class...

Chat Participants (95)

☐ Disable group chat

Prakash Kumar  
pmf discrete and PDF  
in Contin

Siraj Kumar...  
f(x)-f(x-1)

PARTHASARATHY K  
JOINED

S Bhagath  
1,3,4,6,12

AARADHA JAIN JOINED

SAI KUMAR K C JOINED

RAKESH T JOINED

DASADHYA VISHVDEEP  
MANISHBHAI JOINED

SWAPNA K JOSEPH  
JOINED

RAJASEKAR D JOINED

0.3

Sending to everyone

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# WEBINAR 2

Cumulative - till

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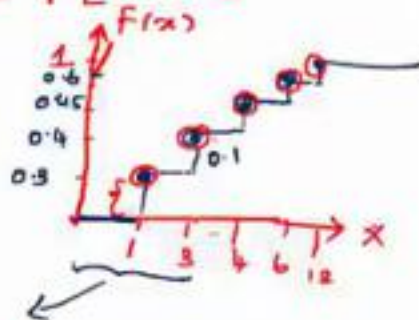
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PMF - discrete

PDF - Continuous

$$F(x) = P[X \leq x]$$

$X = 1, 3, 4, 6, 12$



$$f(x) = \begin{cases} 0.3 & x=1 \\ & x=3 \end{cases}$$

Virtual Class...

Chat Participants (95)

☐ Disable group chat

in Contin

Suraj Kumar...  
f(x)=f(x-1)

PARTHASARATHY K. JOINED

S Bhagath  
1,3,4,6,12

ANKANSHA JAIN JOINED

SAI KUMAR R. C. JOINED

RAJESH T. JOINED

DAKADHYA VISHVDEEP  
MANISHBHAI JOINED

SWAPNA K JOSEPH  
JOINED

RAJASEKAR O. JOINED

0.3

0.1

Sending to everyone

Write Message



# WEBINAR 2

Cumulative - till

$$f(x) = \frac{p(x)}{p(x=x)} = \frac{p(x)}{p(x=a)}$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

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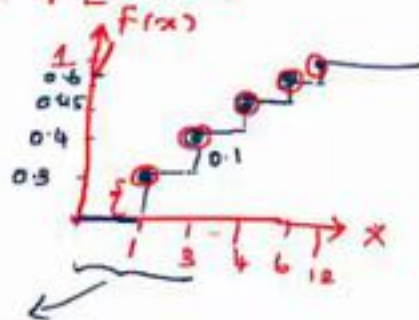
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$$f(x) = \begin{cases} 0.3 & x=1 \\ ? & x=3 \end{cases}$$

Virtual Class...

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$f(x) - f(x-1)$

PARTHASARATHY K JOINED

S Bhagath 1,3,4,6,12

AARAKSHA JAIN JOINED

SAI KUMAR K C JOINED

RAKESH T JOINED

DASADIYA VISHVDEEP MANISHBHAI JOINED

SWAPNA K JOSEPH JOINED

RAJASEKAR D JOINED

0.3

0.1

Vivek Singh .1

Sending to every one

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# WEBINAR 2

$x=2, 0.1$

Cumulative - till

$f(x)$

$p(x)$

$p(x=x)$

prob

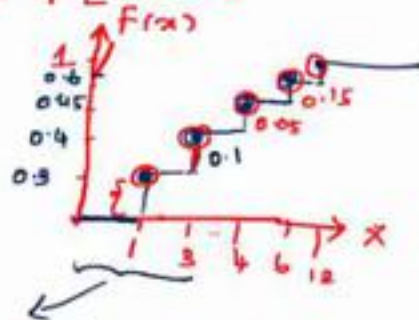
$p(x=a)$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $X$  be the number of months between successive payments. The cdf of  $X$  is as follows

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PMF - discrete

PDF - Continuous

$$\begin{aligned} b. & P[X = 3, 4, 6] \\ &= 0.1 + 0.05 + 0.15 \\ &= 0.3 \end{aligned}$$

$$a. f(x) = \begin{cases} 0.3 & x=1 \\ 0.1 & x=3 \\ 0.05 & x=4 \\ 0.15 & x=6 \\ 0.4 & x=12 \\ 0 & \text{otherwise} \end{cases}$$

$$\begin{array}{r} x & 0 & 1 & 2 & 3 \\ \hline & 0 & 0.3 & 0.4 & 0.45 \end{array}$$

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0.3 0:11 pm

Rubindra Harlaka

Why can we say that prob of  $X=2$  is 0. the CDF doesn't necessarily say that

0:11 pm

RAGAVENDRAN U JOINED

Seelan Reshma Monica

Is it not  $P(X \leq 6) - P(X \leq 3)$

0:11 pm

ok got it

0:11 pm

Rubindra Harlaka

Not totally convinced

0:11 pm

M R Vijay Krishnan

In our case if  $X=2$  the probability will be 0 right

0:12 pm

Rubindra Ha...

Ok

0:12 pm

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# WEBINAR 2

$x=2, 0.1$

Cumulative till

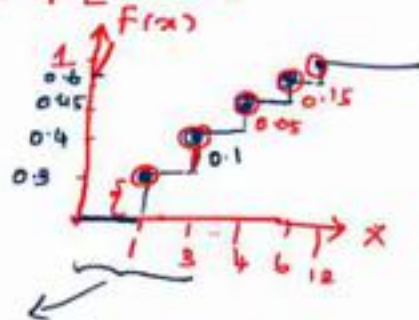
$$f(x) \quad \frac{p(x)}{p(x=x)} \quad \text{prob } p(x=a)$$

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- What is the PMF of  $X$ ?
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$$a. \quad f(x) = \begin{cases} 0.3 & x=1 \\ 0.1 & x=3 \\ 0.05 & x=4 \\ 0.15 & x=6 \\ 0.4 & x=12 \\ 0 & \text{otherwise} \end{cases}$$

$$\frac{x \quad 0 \quad 1 \quad 2 \quad 3}{f(x) \quad .}$$

Virtual Class...

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Rabindra Haritaka  
Why can we say that prob of  $X=2$  is 0.. the CDF doesn't necessarily say that

RAGAVENDRAN U JOINED

Seelan Reshma Monica  
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Rabindra Ha...  
Ok

BUU M JOINED

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# WEBINAR 2

$x=2, 0.1$

Cumulative- till

$$f(x) \quad \frac{p(x)}{p(x=x)} \quad \frac{p(x)}{p(x=a)}$$

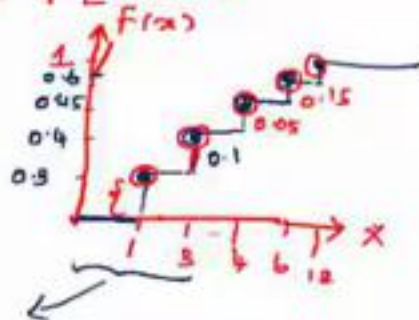
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$X = 1, 3, 4, 6, 12$

$$F(x) = P[X \leq x]$$



- What is the PMF of  $X$ ?
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$$\begin{array}{r} x \quad 0 \quad 1 \quad 2 \quad 3 \\ f(x) \quad 0.1 \quad 0.4 \quad 0 \quad 0.5 \\ \hline F(x) \quad 0.1 \quad 0.5 \quad 0.5 \quad 1 \end{array}$$

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Robindra Harilaka  
Why can we say that prob of  $X=2$  is 0.. the CDF doesn't necessarily say that

RAGAVENDRAN U. JOINED

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Ok

BJU M. JOINED

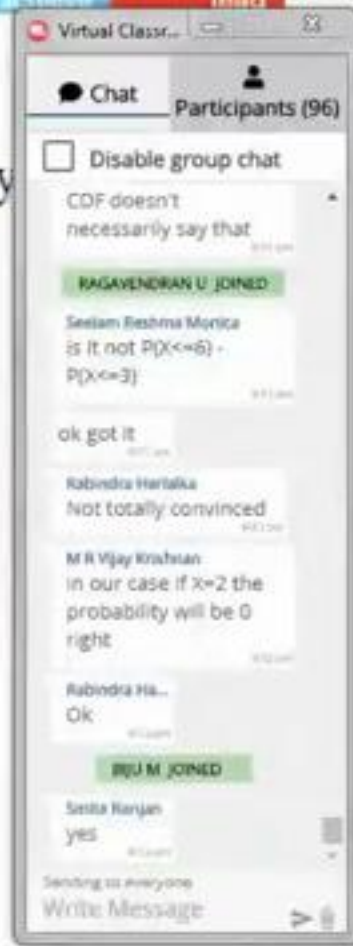
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# WEBINAR 2

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$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \leq x < 3 \\ .40 & 3 \leq x < 4 \\ .45 & 4 \leq x < 6 \\ .60 & 6 \leq x < 12 \\ 1 & 12 \leq x \end{cases}$$

- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(x)$  and Variance of  $X$ .





# WEBINAR 2

$$0 \leq P(x) \leq 1$$

$$E(x) \rightarrow X = \{1, 3, \dots\}$$

3. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let  $x$  be the number of months between successive payments. The cdf of  $X$  is as follows

$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \leq x < 3 \\ .40 & 3 \leq x < 4 \\ .45 & 4 \leq x < 6 \\ .60 & 6 \leq x < 12 \\ 1 & 12 \leq x \end{cases}$$

- What is the PMF of  $X$ ?
- Compute  $P(3 \leq X \leq 6)$
- Obtain  $E(x)$  and Variance of  $X$ .

$x$	1	3	4	6	12
$P(x)$	0.3	0.1	0.05	0.15	0.4
$x P(x)$	0.3	0.3	0.2	0.9	4.8
$x^2 P(x)$					

$$E(x) = \sum x P(x) = 6.5$$

$$Var(x) = E(x^2) - (E(x))^2 = 22.75$$

Virtual Classr...

Chat Participants (94)

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pl specify the terms used mam

yes

like e^x

No

K Girish Gopinathan  
What is meaning of E(x)

\*E(x)

Okay..

Gunasekaran R  
I think like e^x on previous slide, there may be some terms which we should know to solve this problem

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# WEBINAR 2

Note: Discrete  $X = 0, 1, 2, 3, \dots$   $X < 2 \Rightarrow \boxed{0, 1}$

Continuous  $0 < X < \infty$

$\boxed{X < 2, X \leq 2}$   $\int_0^2$  ~~not  $\int_0^1$~~

4. Let  $X$  denote the temperature at which a certain chemical reaction takes place that  $X$  has pdf  $\rightarrow$  continuous

$$f(x) = \begin{cases} \frac{1}{9}(4-x^2) & -1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

$$f(x) = \begin{cases} \frac{1}{9}(4-x^2) & -1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

- a. Compute  $P(0 \leq X \leq 1)$   
b. Obtain  $E(X)$  and Variance of  $X$

Average  
Mean

expected value  $\times$

$$P(0 \leq x \leq 1)$$

$$= \int_0^1 \frac{1}{9}(4-x^2) dx$$

$$= \frac{1}{9} \left[ 4x - \frac{x^3}{3} \right]_0^1 = \frac{11}{27}$$

$$= \frac{1}{9} \left[ \right]$$

Virtual Classr...

Chat Participants (94)

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pl specify the terms used mam

yes

like e^x

No

K Gireh Gopinathan  
What is meaning of E(x)

\*E(x)

Okay..

Gurasekaran R  
I think like e^x on previous slide, there may be some terms which we should know to solve this problem

Sending to everyone

Write Message



# WEBINAR 2

5. A service station has both self-service and full-service islands. On each island, there is a single regular unleaded pump with two hoses. Let  $X$  denote the number of hoses being used on the self-service island at a particular time and let  $Y$  denote the number of hoses on the full-service island in use at that time. The joint probability mass function of  $X$  and  $Y$  is given below:

X	Y		
	0	1	2
0	0.10	0.04	0.02
1	0.08	0.20	0.06
2	0.06	0.14	0.30

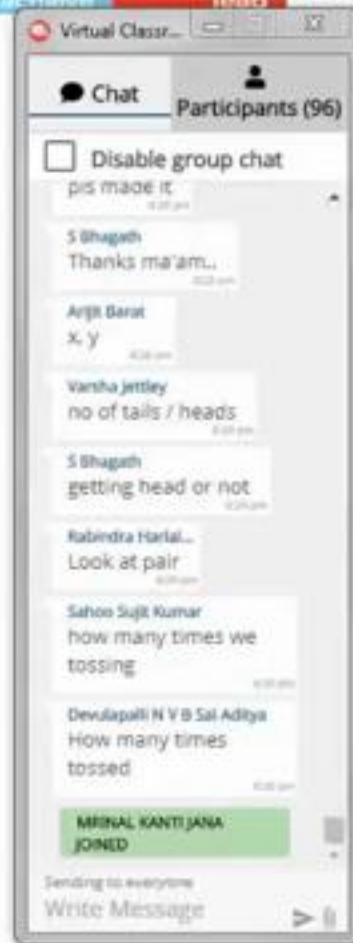
- Find the marginal probability mass function of  $X$  and  $Y$
- Give the verbal description the event  $(X \neq 0 \text{ and } Y \neq 0)$  and compute the probability of this event.
- Find  $P(X=1|Y=2)$  and  $P(Y=2|X=1)$



# WEBINAR 2

X	Y		
	0	1	2
0	0.10	0.04	0.02
1	0.08	0.20	0.06
2	0.06	0.14	0.30

- Find the marginal probability mass function of X and Y
- Give the verbal description the event  $(X \neq 0 \text{ and } Y \neq 0)$  and compute the probability of this event.
- Find  $P(X=1/Y=2)$  and  $P(Y=2/X=1)$



# WEBINAR 2

Tossing coins  $\begin{cases} X : \text{No. of heads/tails} \\ Y : \text{No. of tosses} \end{cases}$

5. A service station has both self-service and full-service islands. On each island, there is a single regular unleaded pump with two hoses. Let  $X$  denote the number of hoses being used on the self-service island at a particular time and let  $Y$  denote the number of hoses on the full-service island in use at that time. The joint probability mass function of  $X$  and  $Y$  is given below:

X	Y		
	0	1	2
0	0.10	0.04	0.02
1	0.08	0.20	0.06
2	0.06	0.14	0.30

- Find the marginal probability mass function of  $X$  and  $Y$
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Virtual Class...

Chat Participants (95)

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.16, .34, .5 - x  
0.10 am

Seelam Res...  
0.16  
0.10 am

S Bhagath  
sum of rows  
0.10 am

Seelam Res...  
0.34  
0.10 am

SL S NVVS...  
.24, .38, .38  
0.10 am

S Bhagath  
0.5  
0.10 am

Seelam Res...  
0.6  
0.10 am

sorry 0.5  
0.10 am

ARJ SINGH DHAMA  
JOINED

0.24, 0.38, 0.38  
0.10 am

Sending to everyone  
Write Message

# WEBINAR 2

X	Y			$f_X(x)$
	0	1	2	
0	0.10	0.04	0.02	0.16
1	0.08	0.20	0.06	0.34
2	0.06	0.14	0.30	0.5

$f_Y(y)$

Marginal PMF

$$f_X(x) = \begin{cases} 0.16 & x=0 \\ 0.34 & x=1 \\ 0.5 & x=2 \\ 0 & \text{other} \end{cases}$$

$$f_Y(y) = \begin{cases} 0.24 & y=0 \\ 0.38 & y=1 \\ 0.38 & y=2 \\ 0 & \text{other} \end{cases}$$

- Find the marginal probability mass function of X and Y
- Give the verbal description the event  $(X \neq 0 \text{ and } Y \neq 0)$  and compute the probability of this event.
- Find  $P(X=1|Y=2)$  and  $P(Y=2|X=1)$

Virtual Class...

Chat Participants (95)

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.16, .34, .5 - x

Seelan Res... 0.16

S Bhagath sum of rows

Seelan Res... 0.34

SLSNVSS... .24, .38, .38

S Bhagath 0.5

Seelan Res... 0.6

sorry 0.5

AJAY SINGH DHAMA JOINED

0.24, 0.38, 0.38

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# WEBINAR 2

$$P(X \neq 0 \text{ and } Y \neq 0) \rightarrow P(A/B) = \frac{P(A \cap B)}{P(B)}$$

$$= 1 - P(X=0 \text{ or } Y=0)$$

Marginal PMF

X	Y			$f_X(x)$
	0	1	2	
0	0.10	0.04	0.02	0.16
1	0.08	0.20	0.06	0.34
2	0.06	0.14	0.30	0.5

$f_Y(y)$

$$f_X(x) = \begin{cases} 0.16 & x=0 \\ 0.34 & x=1 \\ 0.5 & x=2 \\ 0 & \text{other} \end{cases}$$

$$f_Y(y) = \begin{cases} 0.24 & y=0 \\ 0.38 & y=1 \\ 0.38 & y=2 \\ 0 & \text{other} \end{cases}$$

- Find the marginal probability mass function of X and Y
- Give the verbal description the event  $(X \neq 0 \text{ and } Y \neq 0)$  and compute the probability of this event.
- Find  $P(X=1|Y=2)$  and  $P(Y=2|X=1)$

$$x=1,2 \quad y=1,2 \rightarrow 1 - P(X=0, Y=0)$$

at least

$$1 - 0.1 = 0.9$$

$$P(X=1|Y=2) = \frac{P(X=1, Y=2)}{P(Y=2)} = \frac{0.06}{0.38} = 0.157 \approx 0.16$$

$$P(Y=2|X=1) = \frac{P(X=1, Y=2)}{P(X=1)} = \frac{0.06}{0.34} = 0.18$$

different

Virtual Classr...

Chat Participants (94)

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yes

S. Bhagata... yes

Q.18

Sesim Res... 0.176

Rabindra Harshika 3/19 and 3/17

Arijit Saha yes

ANAND JETARAMAN JOINED

Rahul Saha yes

K Ganesh Gopalan For b, can you explain again how you got 0.9?

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# WEBINAR 2

Exercise. "Midsem."

Consider the following Joint distribution of two random variables X and Y

X \ Y	1	2	3	4	5
1	0	0	2k	4k	4k
2	4k	4k	8k	8k	8k
3	2k	2k	k	k	0

$f_Y(y)$  6k 6k 11k 13k 12k

a. For what value(s) of k it is a valid distribution :  $64k = 1$

$$k = \frac{1}{64}$$

b. Find Marginal Distribution of X and Y

c. Find  $P(X \leq 2)$

d. Find  $P(X \leq 2 / Y = 2)$

e. Find  $P(X \leq 3 / Y \leq 2)$



# WEBINAR 2

Exercise. "Midsem."



Consider the following Joint distribution of two random variables X and

X \ Y	1	2	3	4	5	6	$f_X(x)$
1	0	0	2k	4k	4k	6k	16k
2	4k	4k	8k	8k	8k	8k	40k
3	2k	2k	k	k	0	2k	8k
	$f_Y(y)$	6k	6k	11k	12k	16k	64k

a. For what value(s) of k it is a valid distribution :  $64k = 1$

$$k = \frac{1}{64}$$

b. Find Marginal Distribution of X and Y

c. Find  $P(X \leq 2)$

d. Find  $P(X \leq 2 / Y = 2)$

=

e. Find  $P(X \leq 3 / Y \leq 2)$

The joint probability mass function of the two random variables (X, Y) is given by

$$f(x, y) = \begin{cases} \frac{1}{5}(3x - y), & 1 \leq x \leq 2, 1 \leq y \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

- a. Find the  $P(X \leq Y)$       b. Find the marginal density functions of X and Y

- c. Are X and Y independent?

- d. Find  $E(XY)$

lead

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Eraser

Highlighter

Shape

Arrange

Color

Stroke

Stroke Dash

Stroke Width

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Replace

Select

Ending

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14

The joint probability mass function of the two random variables (X, Y) is given by

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a. Find the  $P(X \leq Y)$

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BIT S Pillar, Pillar Campus

SLIDE 17 OF 22ENGLISH INDIA

NOTESCOMMENTS

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ArrangeQuick Styles

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The joint probability mass function of the two random variables (X, Y) is given by

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d. Find  $E(XY)$

ChatParticipants (93)

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nk

Thanks

M R Vijay Krishna

SURE

Senthil Res...

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S Bhagathi

$k = 1 / 54$

Prakash Ra...

$k = 1 / 54$

M R Vijay Krishna

please share the ppt after the session please

S Bhagathi

Ma'am, with answer for all questions will be helpful.

Waiting to respond

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SLIDE 12 OF 22

ENGLISH (INDIA)

NOTESCOMMENTS

71%

20:43 07-12-2021



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The joint probability mass function of the two random variables (X, Y) is given by

$$f(x,y) = \begin{cases} \frac{1}{5}(3x-y), & 1 \leq x \leq 2, 1 \leq y \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

a. Find the  $P(X \leq Y)$

b. Find the marginal density functions of X and Y

c. Are X and Y independent?

d. Find  $E(XY)$

Virtual Classroom

ChatParticipants

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ok

Thanks

M R Vijay Krishna

Sure

Sastham Res...

Sure

S Bhagath

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Sending to everyone

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SLIDE 12 OF 22

ENGLISH (INDIA)

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07-12-2021

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Virtual Class...

Chat    Participa...

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Thanks  
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M R Vijay Kr...  
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M R Vijay Krishnan  
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S Bhagath  
Ma'am.. with answer  
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08:00 pm

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# WEBINAR 2

Exercise. "Midsem."

Consider the following Joint distribution of two random variables X and

X \ Y	1	2	3	4	5	6	$f_X(x)$
1	0	0	2k	4k	4k	6k	16k
2	4k	4k	8k	8k	8k	8k	40k
3	2k	2k	k	k	0	2k	8k
$f_Y(y)$	6k	6k	11k	13k	12k	16k	64k

a. For what value(s) of k it is a valid distribution :  $64k = 1$

$$k = \frac{1}{64}$$

b. Find Marginal Distribution of X and Y

c. Find  $P(X \leq 2)$

d. Find  $P(X \leq 2 / Y = 2)$

=

e. Find  $P(X \leq 3 / Y \leq 2)$

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ok

Thanks

M R Vijay Kr...  
sure

Senthil Res...  
SURE

S Bhagath  
k = 1 / 64

Prakash Ku...  
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M R Vijay Krishna  
please share the ppt  
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S Bhagath  
Ma'am... with answer  
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M R Vijay Kr...  
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# WEBINAR 2

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S Bhagath  
above

Arijit Baral  
1 < 3

Neeraj Sabhrami  
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Geeta Raviyani Beta Prasad  
x <= y for above  
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Neeraj Sabh...  
ok thanks

S Bhagath  
x to 3

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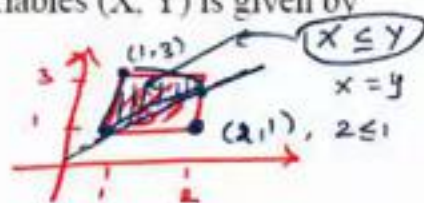
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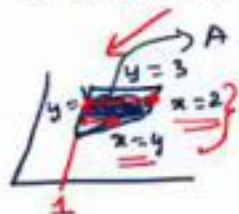
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*mid sem*

$$f(x, y) = \begin{cases} \frac{1}{5} (3x - y), & 1 \leq x \leq 2, 1 \leq y \leq 3 \\ 0, & \text{otherwise} \end{cases}$$



a. Find the  $P(X \leq Y)$



b. Find the marginal density functions of X and Y



$$\begin{aligned} P(X \leq Y) &= \int_A \int \frac{1}{5} (3x - y) dx dy \\ &= \int_1^3 \int_1^y \frac{1}{5} (3x - y) dx dy \\ &= \int_1^3 \int_x^3 \frac{1}{5} (3x - y) dy dx \end{aligned}$$

*[S + S]*

c. Are X and Y independent?

d. Find  $E(XY)$

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S Bhagath  
above

Arijt Barat  
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Geeta Ramani (Bala Prasad)  
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x <= y for above  
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Neeraj Sabh...  
ok thanks

S Bhagath  
x to 3

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ISM-Tutorials JOINED

ok mam

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# WEBINAR 2



It has been claimed that in 60% of all solar-heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in

- a. four of five installations;
- b. at least four of five installations
- c. at most four of five installations?

**Solution** (a) Substituting  $x = 4$ ,  $n = 5$ , and  $p = 0.60$  into the formula for the binomial distribution, we get

$$\begin{aligned} b(4; 5, 0.60) &= \binom{5}{4} (0.60)^4 (1 - 0.60)^{5-4} \\ &= 0.259 \end{aligned}$$

(b) Substituting  $x = 5$ ,  $n = 5$ , and  $p = 0.60$  into the formula for the binomial distribution, we get

$$\begin{aligned} b(5; 5, 0.60) &= \binom{5}{5} (0.60)^5 (1 - 0.60)^{5-5} \\ &= 0.078 \end{aligned}$$

and the answer is  $b(4; 5, 0.60) + b(5; 5, 0.60) = 0.259 + 0.078 = 0.337$

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x to 3  
1 to 2

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Prakash Ku...  
13

CHITRA DEVA JOINED

S Bhagath  
 $x^2 dx y^2 dy?$

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## WEBINAR 2

For health reasons, homes need to be inspected for radon gas which decays and produces alpha particles. One device counts the number of alpha particles that hit its detector. To a good approximation, in one area, the count for the next week follows a Poisson distribution with mean 1.3. Determine

- the probability of exactly one particle next week.
- the probability of one or more particles next week.
- the probability of at least two but no more than four particles next week.

**Solution** Unlike the binomial case, there is no choice of a fixed Bernoulli trial here because one can always work with smaller intervals.

$$(a) P(X = 1) = \frac{\lambda^1 e^{-\lambda}}{1!} = \frac{1.3 e^{-1.3}}{1} = 0.3543$$

Alternatively, using Table 2W,  $P(1, 1.3) - P(0, 1.3) = 0.627 - 0.273 = 0.354$

$$(b) P(X \geq 1) = 1 - P(X = 0) = 1 - e^{-1.3} = 0.727$$

$$(c) P(2 \leq X \leq 4) = F(4, 1.3) - F(1, 1.3) = 0.989 - 0.627 = 0.362$$

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CHITRA DEVI A JOINED

S Bhagath  
x\*dx y\*dy?

Suraj Kumar Jha  
If possible please  
upload solutions to a

Jibesh Pal  
can you please uploa  
all the files?

Arjit Sarat  
this is last webinar  
before mid sem?

Kantha C  
Madam we can plan  
additional webinar

S J KRISHNA KASIBHOTLA  
JOINED

Thanks Madam

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# WEBINAR 2

A computing system manager states that the rate of interruptions to the internet service is 0.2 per week. Use the Poisson distribution to find the probability of

- one interruption in 3 weeks
- at least two interruptions in 5 weeks
- at most one interruption in 15 weeks.

**Solution:** Interruptions to the network occur randomly and the conditions for the Poisson distribution initially appear reasonable. We have  $\lambda = 0.2$  for the expected number of interruptions in one week.

In terms of the cumulative probabilities,

(a) with  $\lambda = (0.2) \cdot 3 = 0.6$ , we get

$$\begin{aligned} F(1; 0.6) - F(0; 0.6) &= 0.878 - 0.549 \\ &= 0.329 \end{aligned}$$

(b) With  $\lambda = (0.2) \cdot 5 = 1.0$ , we get

$$\begin{aligned} 1 - F(1; 1.0) &= 1 - 0.736 \\ &= 0.264 \end{aligned}$$

(c) With  $\lambda = (0.2) \cdot 15 = 3.0$  we get

$$F(1; 3.0) = 0.199$$

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Kantha C  
Madam we can plan  
additional webinar

SJ KRISHNA KASIBHOTLA  
JOINED

Thanks Madam

M R Vijay Kir...  
sure

Rowthu Sri Satya P...  
thankyou Mam

S Bhagath  
Thanks ma'am...

Botra Aman Dinesh  
Thank You Ma'am!!

Prakash Kumar  
Very Nice excellent  
explanation

Thanks

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# WEBINAR 2

## The Poisson Approximation to the Binomial Distribution:

11. It is known that 5% of the books bound at a certain bindery have defective bindings. Find the probability that 2 of 100 books bound by this bindery will have defective bindings using
- the formula for the binomial distribution;
  - the Poisson approximation to the binomial distribution.

**Solution** (a) Substituting  $x = 2$ ,  $n = 100$ , and  $p = 0.05$  into the formula for the binomial distribution, we get

$$b(2; 100, 0.05) = \binom{100}{2} (0.05)^2 (0.95)^{98} = 0.081$$

- (b) Substituting  $x = 2$  and  $\lambda = 100(0.05) = 5$  into the formula for the Poisson distribution, we get

$$f(2; 5) = \frac{5^2 \cdot e^{-5}}{2!} = 0.084$$

It is of interest to note that the difference between the two values we obtained (the error we would make by using the Poisson approximation) is only 0.003. [Had we used Table 2W instead of using a calculator to obtain  $e^{-5}$ , we would have obtained  $f(2; 5) = F(2; 5) - F(1; 5) = 0.125 - 0.040 = 0.085$ .]

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Kanika C  
Madam we can plan  
additional webinar

S J KRISHNA KASIBHOTLA  
JOINED

Thanks Madam

M R Vijay Kr...  
sure

Rowthu Sri Satya P...  
thankyou Mam

S Bhagath  
Thanks ma'am...

Bobba Athan Dinesh  
Thank You Ma'am,!!

Prakash Kumar  
Very Nice excellent  
explanation

Thanks

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# WEBINAR 2

Let  $X$ , the grade of a randomly selected student in a test of a ISM course, be a normal random variable. A professor is said to grade such a test on the curve if he finds the average  $\mu$  and the standard deviation  $\sigma$  of the grades and then assigns letter grades according to the following table.

Range of the grade	$X \geq \mu + \sigma$	$\mu \leq X < \mu + \sigma$	$\mu - \sigma \leq X < \mu$	$\mu - 2\sigma \leq X < \mu - \sigma$	$X < \mu - 2\sigma$
Letter grade	A	B	C	D	F

Suppose that the professor of the probability course grades the test on the curve. Determine the percentage of the students who will get A, B, C, D, and F, respectively.

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S J KRISHNA KASIBHOTLA  
JOINED

Thanks Madam

M R Vijay Kr...  
SURE

Rowthu Sri Satya P...  
thankyou Mam

S Bhagath  
Thanks ma'am...

Bahra Aman Dinesh  
Thank You Ma'am..0

Prakash Kumar  
Very Nice excellent  
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Thanks

Raghavendra G V  
Thanks madam

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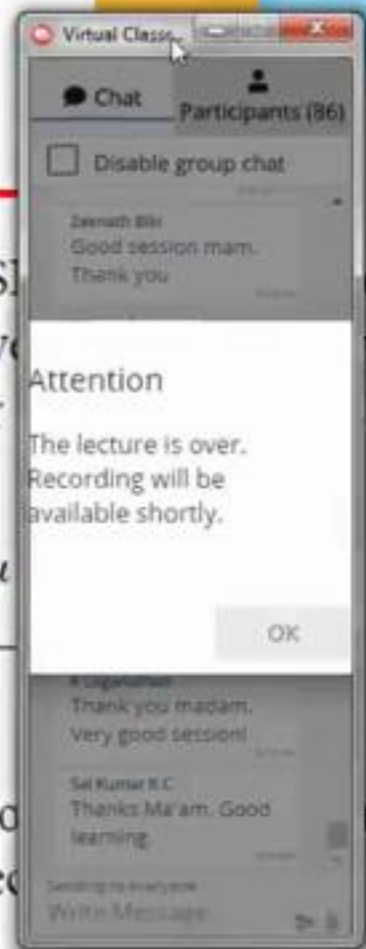


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