

Remedial- Session -2

{ ① Bayes Theorem — Problems
 & Joint Prob

[② Joint & Marginal Prob → Problem
 Independence

③ Var(ax) & formulae → Algebra + Proof

{④ Confidence - Interval → real-world
interpretation & examples

⑤ Need of Expectation

⑥ Applications of PDF, CDF

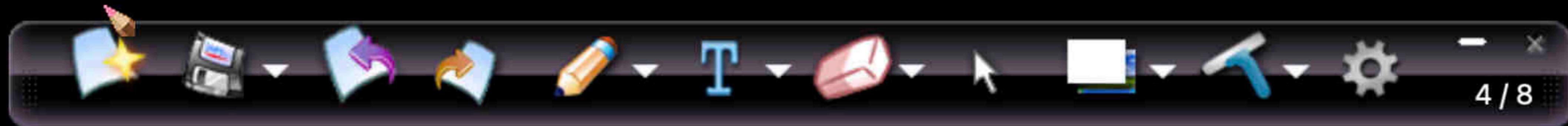
⑦

HHT or HTT problem → intuitive } ✓

⑧

Is it Gaussian or not?

tentative



4 / 8

~~Ops~~

Ques → tab

Chat → discussion

Yes/No

$$P(I_2) = 0.5$$

Prev. problem

①

50% of people who
are invited for the

attend 1st interview
2nd interview

②

95% of people invited
felt they did well in 1st interview

for 2nd interview $P(G_1 | I_2)$
= 0.95

③

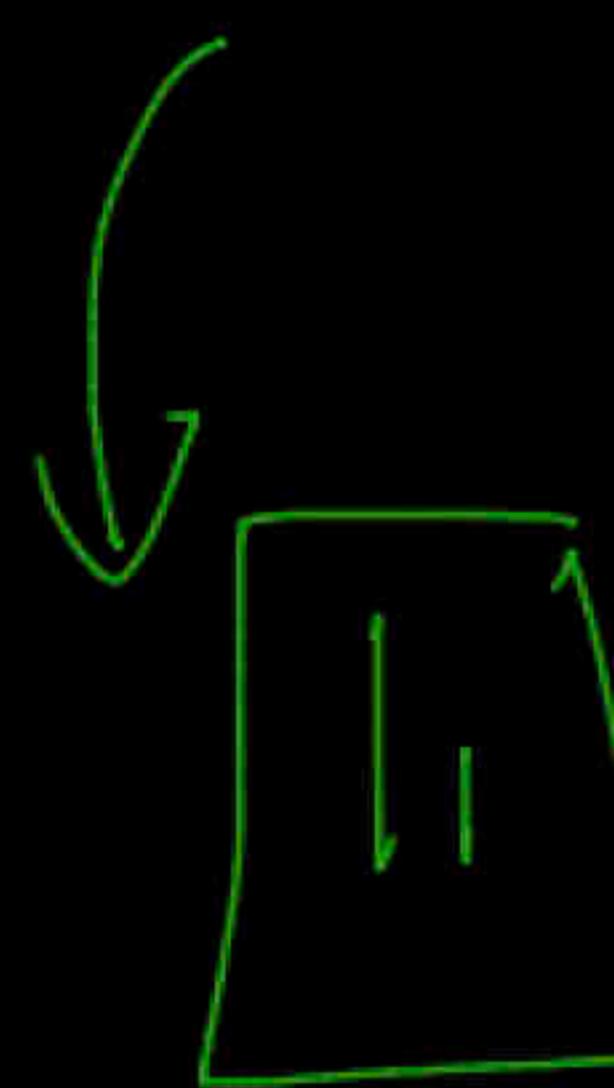
75% of people who didn't get a 2nd interview
call felt they had a good 1st interview

$P(G_1 | \text{NOT } I_2)$
= 0.75

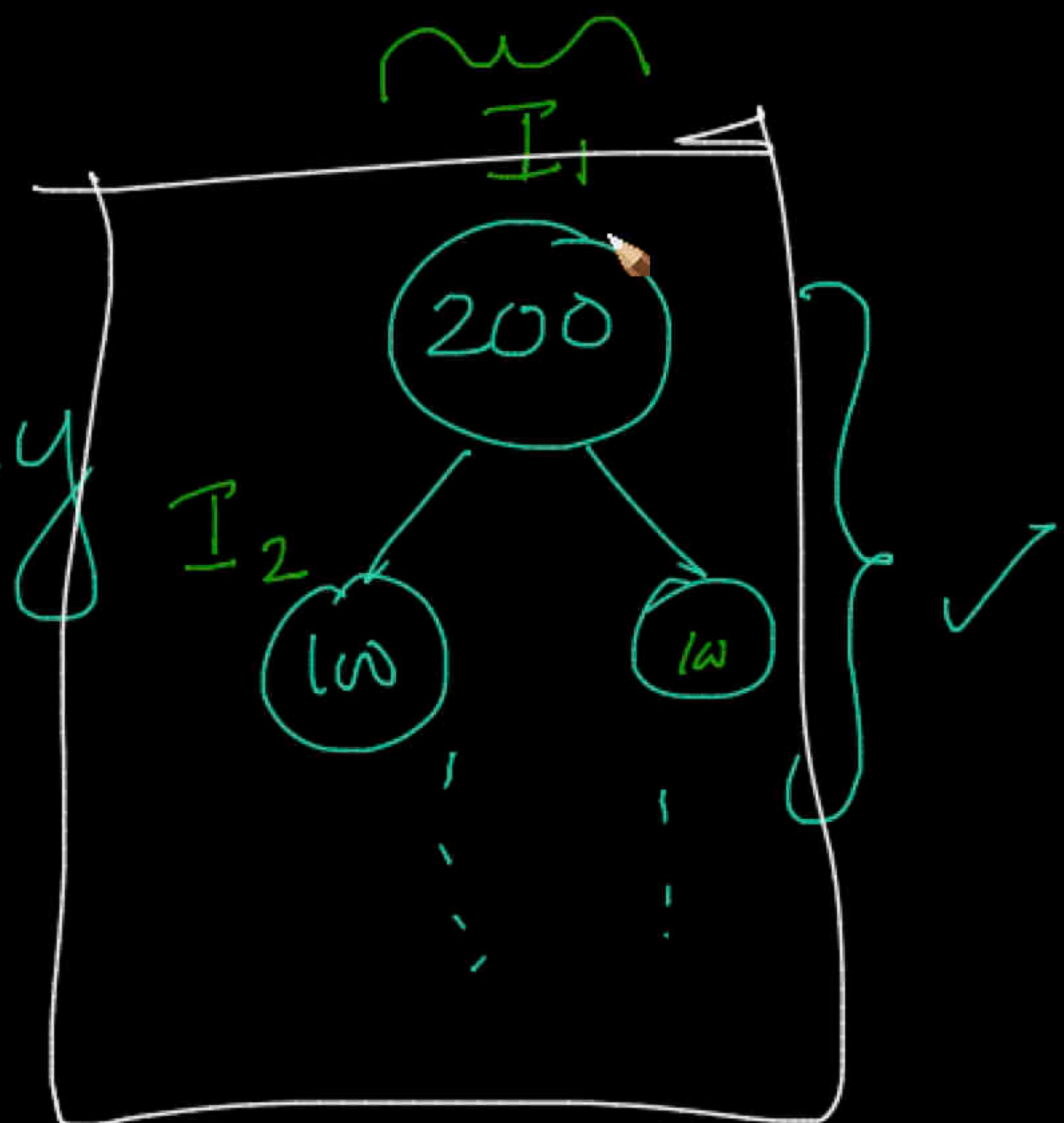
$$P(I_2 | G_1) = ?$$

if you feel you have done well in 1st interview, what's the probability you have

2nd interview



intuitively



Given:

$$\checkmark P(I_2) = 0.5$$

Find:

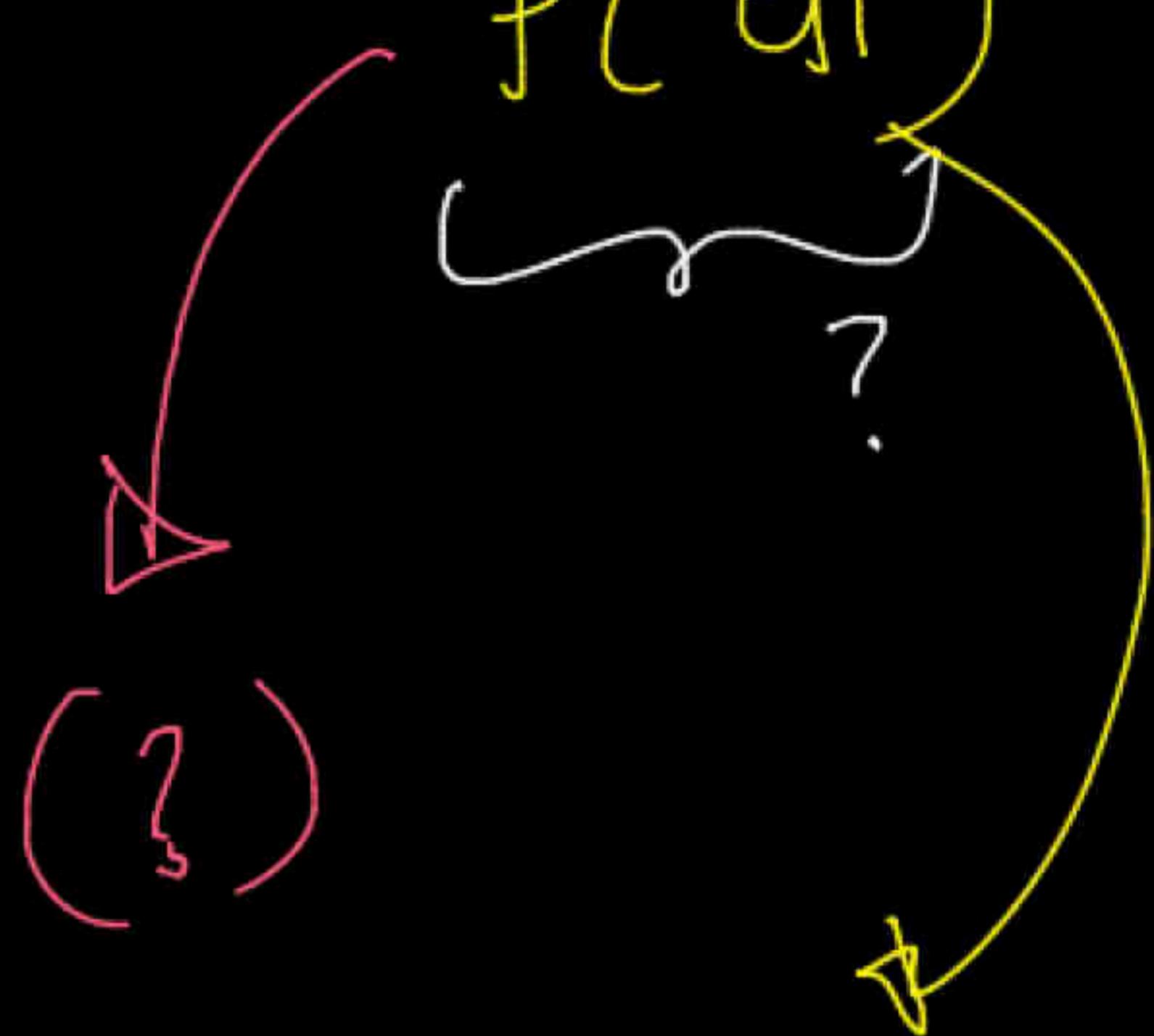
$$P(I_2 | G_1) = ?$$

$$\checkmark P(G_1 | I_2) = 0.95$$

$$P(G_1 | \text{NOT } I_2) = 0.75$$

find

$$P(I_2 | G_1) = \frac{P(I_2 \cap G_1)}{P(G_1)} = \frac{P(G_1 | I_2) P(I_2)}{P(G_1)}$$

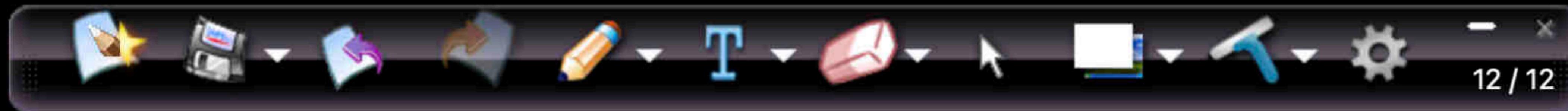


0.85

$$= 0.559$$

$$\begin{aligned} P(G_1) &= P(G_1 \cap I_2) + P(G_1 \cap \overline{NOT(I_2)}) \\ &\quad \downarrow \\ P(G_1 | I_2) P(I_2) &+ P(G_1 | \overline{NOT(I_2)}) \\ &\quad \downarrow \\ 0.95 \times 0.5 &+ 0.75 \times 0.5 \\ &= 0.85 \end{aligned}$$

- ① English → EQUATIONS
- ② Given ; find
- ③ Algebra & EQUATIONS & PROPERTIES



$$P(C) = 0.001$$

1 ✓ 0.1% of population has covid

2 ✓ Rapid RT PCR \rightarrow 99% +ve when infected

3 ~✓ 0.5% \rightarrow +ve if "not" infected

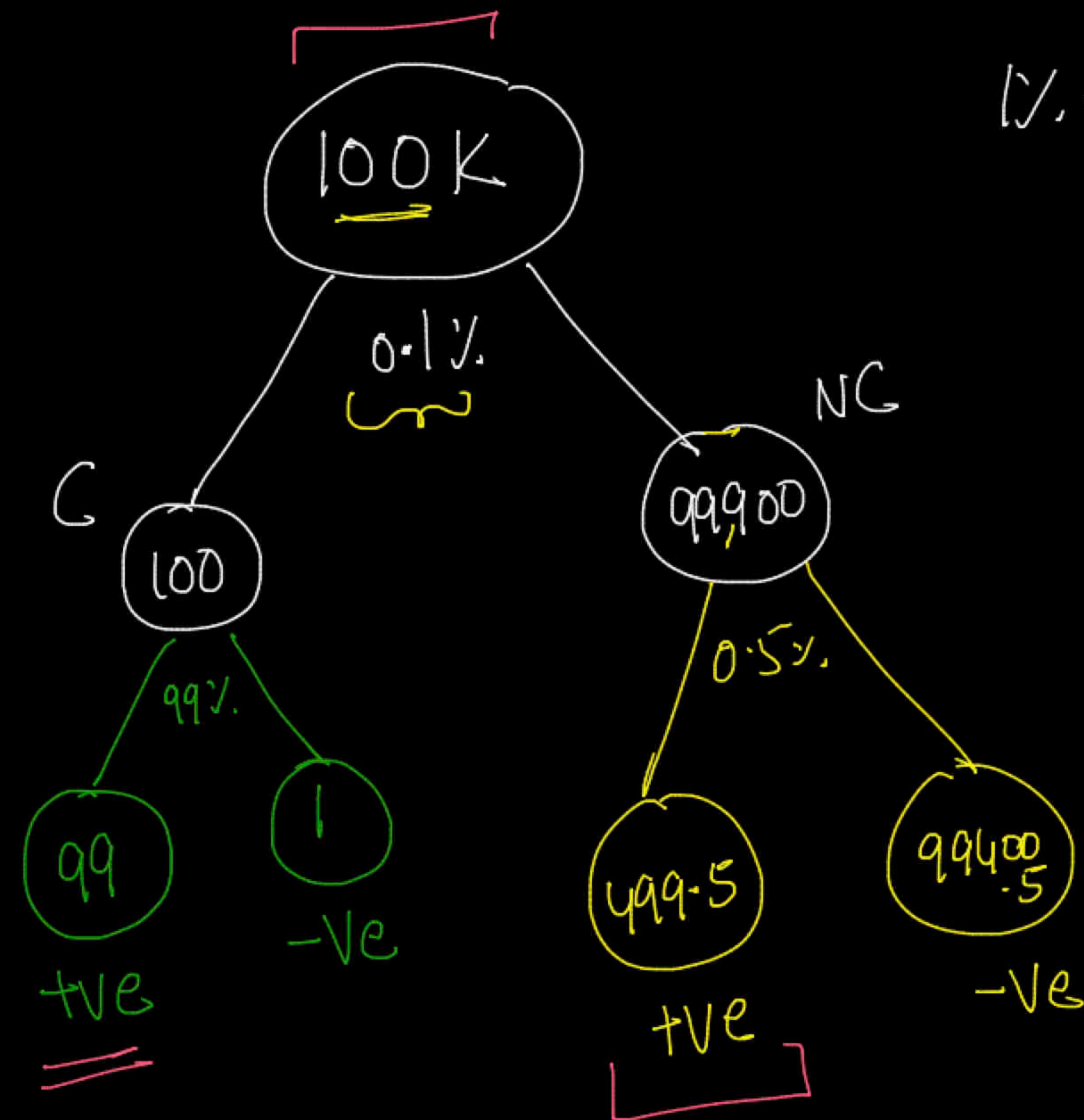
{ Prob that you actually infected
if Rapid test says +ve? $\rightarrow P(C|+ve)$

$$P(+ve|C) = 0.99$$

$$P(+ve|NC) \approx 1/6$$

$$\approx 16.5\%$$

$$P(C|+ve)$$



$\therefore \Rightarrow$ Out of 100

$$\begin{aligned}
 & 99 \\
 & 99 + 499 - 5 \\
 & = 0.165 \\
 & = 16.5\%
 \end{aligned}$$

what

find:

$$P(C) = 0.001$$

$$P(C|+ve)$$

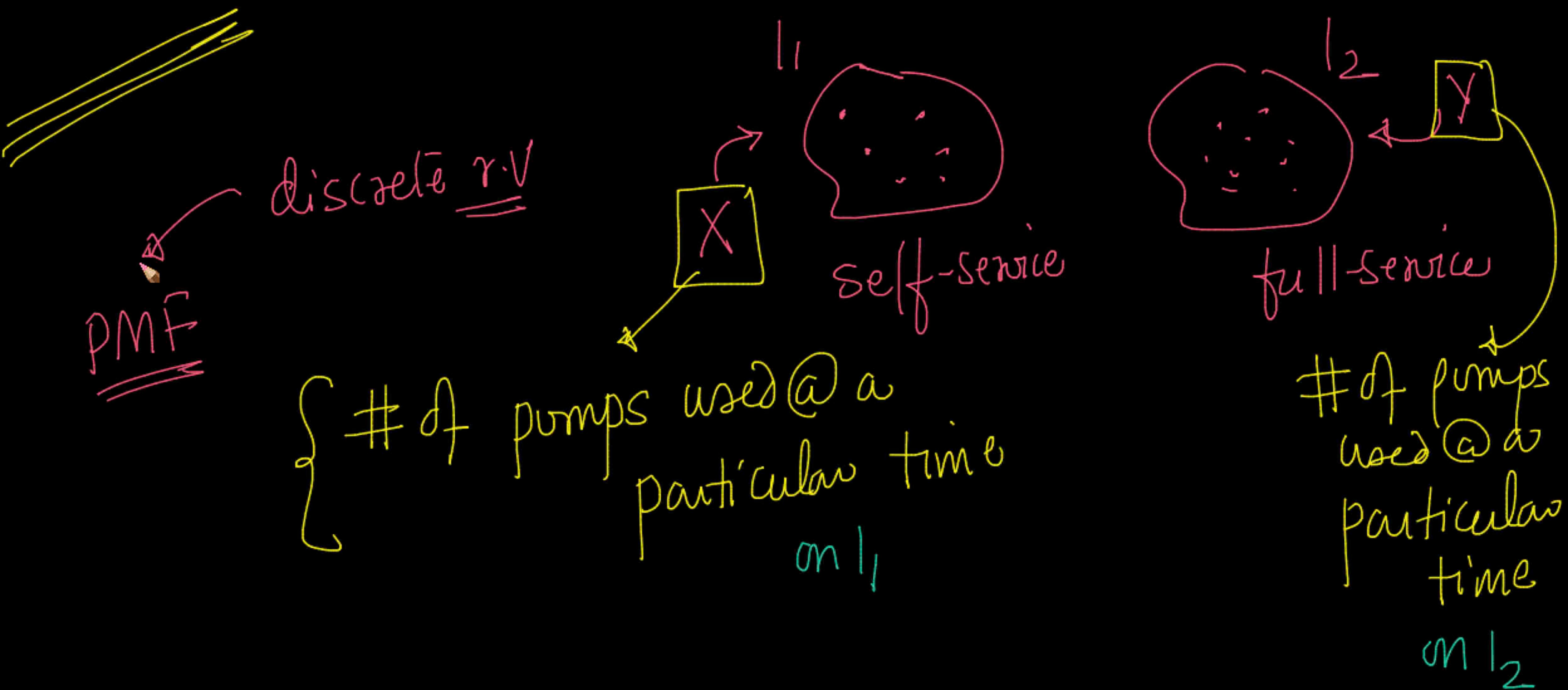
$$P(+ve|C) = 0.99$$

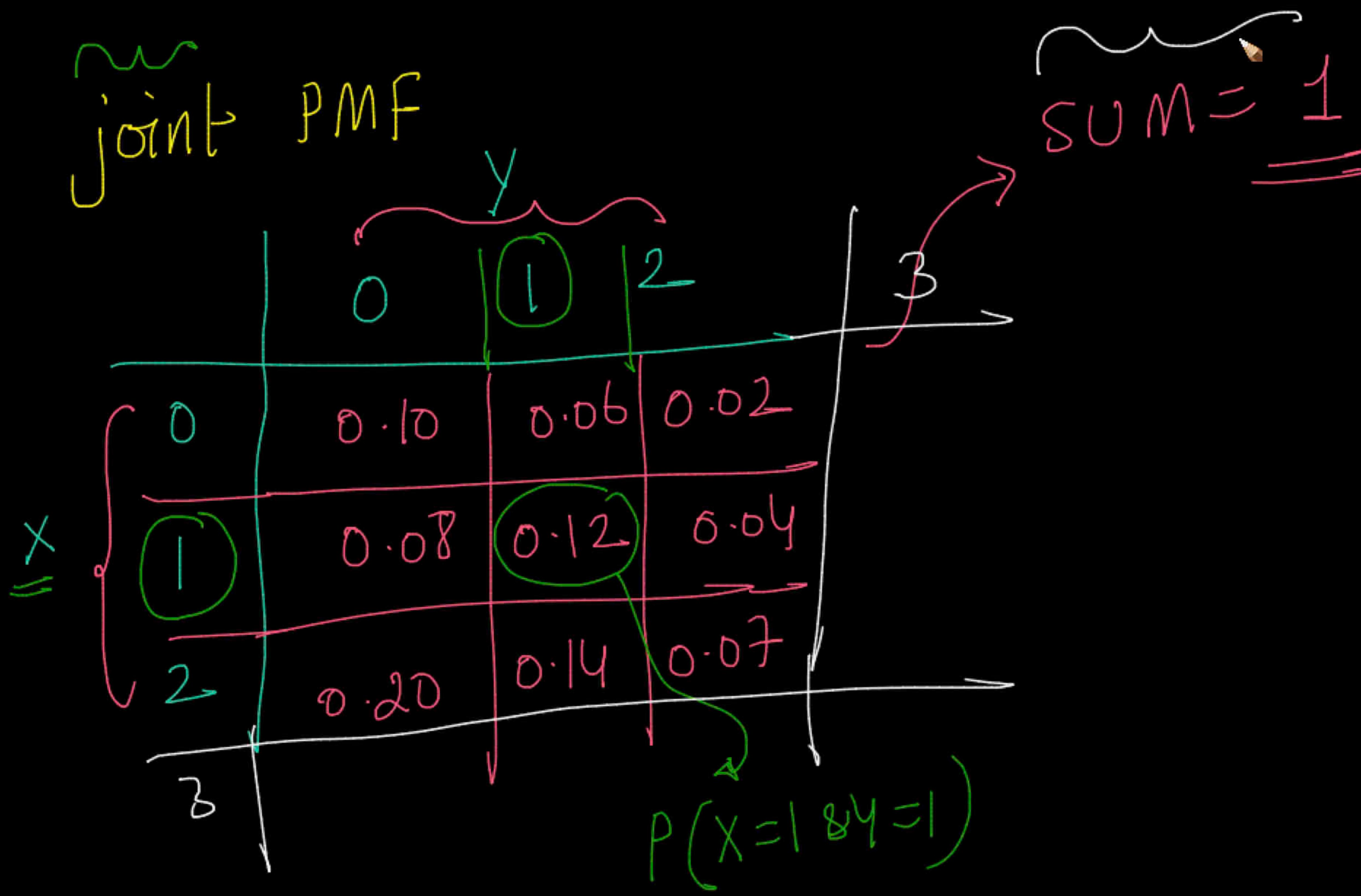
$$= \frac{P(+ve|C) P(C)}{P(+ve)}$$

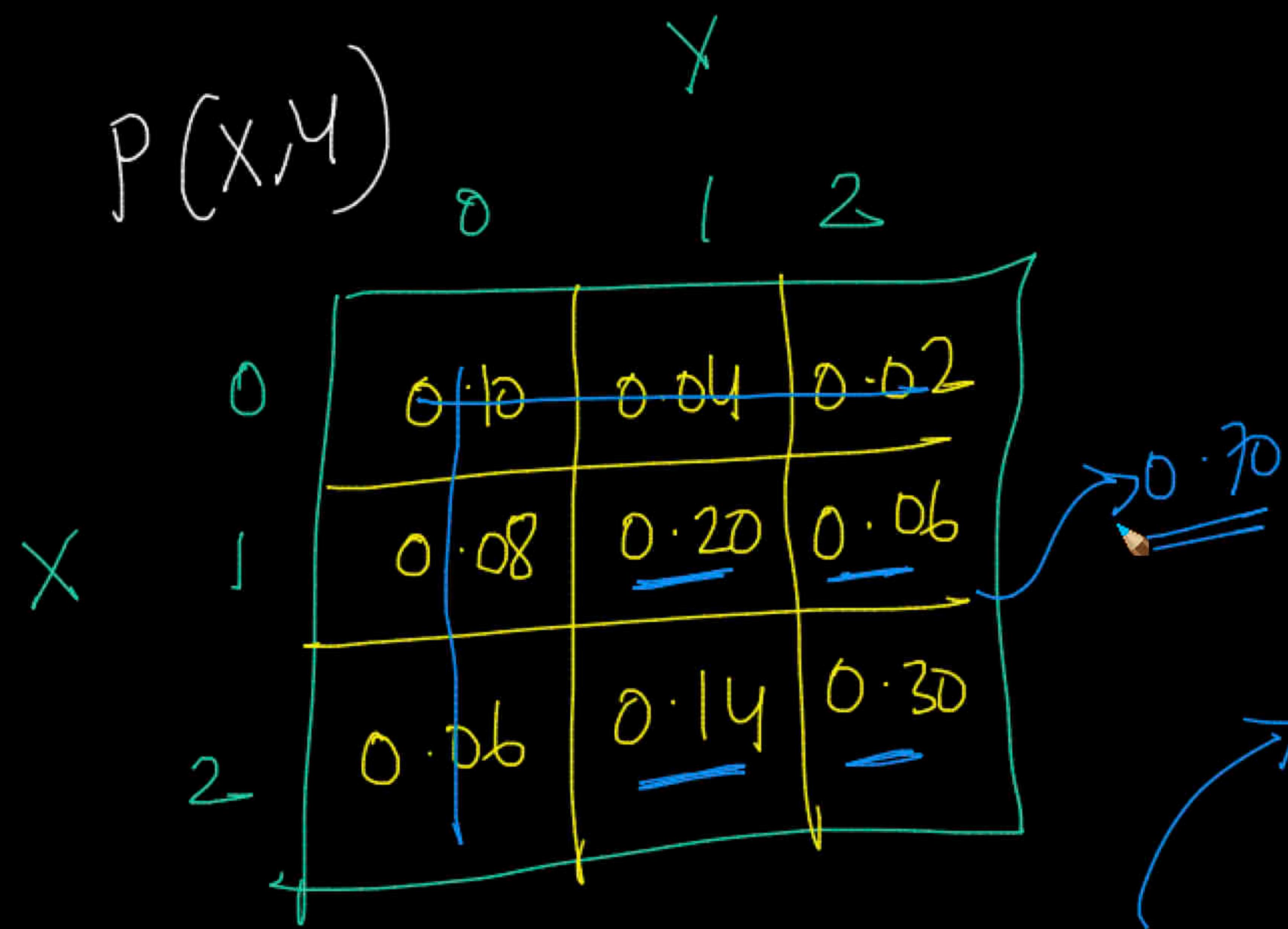
$$P(+ve|NC) = 0.005$$

$$P(+ve|C) P(C) + P(+ve|NC) \underline{\underline{P(NC)}}$$

(-0.001)







$$P(X=1 \text{ and } Y=1)$$

$X=1$ and $Y=1$

$X=2$ and $Y=1$

$X=2$ and $Y=2$

(Q1) $P(X \geq 1 \text{ and } Y \geq 1)$

and
 $P(X, Y)$

		Y	
		1	2
X	0	0.10 0.04 0.08	0.02 0.20 0.06
	1	0.16 0.34 0.50	
2	0.24 0.38 0.38		

Marginal Prob

$$\begin{aligned} P(X) : P(X=1) &= 0.34 \\ P(X=2) &= 0.50 \\ P(X=0) &= 0.16 \end{aligned}$$

$$\begin{aligned} P(Y) : P(Y=0) &\approx 0.24 \\ P(Y=1) &\approx 0.38 \\ P(Y=2) &\approx 0.38 \end{aligned}$$

Math

$$P(X=i) = \sum_{j=0,1,2}^1 P(X=\underline{i} \text{ and } Y=\underline{j})$$

$$P(Y=j) = \sum_{i=0,1,2} P(X=\overline{i} \text{ and } Y=\underline{j})$$

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P(X/Y)

	0	1	2
0	0.10	0.14	0.12
1	0.08	0.20	0.06
2	0.06	0.14	0.30

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Q Are X & Y independent?

$P(X/Y) = P(X) P(Y) \times$

$$P(X=1, Y=1) = 0.2 \stackrel{?}{=} P(X=1) P(Y=1)$$

$$\stackrel{?}{=} 0.34 \times 0.38$$

Srikanth Varma Chekuri (You)

Chat Notify me about Nothing

PRANEETH KUMAR To: Everyone 9:54 PM need to verify $p(x \text{ inter } y)$ is $p(x)*p(y)$?

Sunny Panchal To: Everyone 9:54 PM $x \text{ and } y = x * y$

9:54 PM

Start Doubt Session

To: Everyone Enable/Disable Chat

Type message

00:55:1

(Q)

$$\text{Var}(a\bar{X}) = a^2 \text{Var}(\bar{X}) \rightarrow \text{Algebra}$$

$$\sum_{i=1}^n \bar{X} : x_1, x_2, \dots, x_n \xrightarrow{\text{obs}} \bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

$a\bar{X} : ax_1, ax_2, \dots, ax_n$

mean = \underline{ax}

$$\frac{ax_1 + ax_2 + \dots + ax_n}{n}$$

$$= a \left(\frac{x_1 + x_2 + \dots + x_n}{n} \right)$$

Mean: \bar{x}

$$\text{Var}(ax) = \frac{1}{n} \sum_{i=1}^n (ax_i - \bar{ax})^2$$
$$= \frac{1}{n} \sum_{i=1}^n a^2 (x_i - \bar{x})^2 = a^2 \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$$
$$= a^2 \text{Var}(x)$$

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01:01:4

Handwritten notes:

$$\sum_{j=1}^n x_j = x_1 + x_2 + \dots + x_n$$

Chat

Notify me about Nothing

Sunny Panchal To: Everyone 10:01 PM using $E(x^2) - (E(x))^2$

10:01 PM 9

10:01 PM 1

To: Everyone Enable/Disable Chat

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Start Doubt Session

GEOMRTT Yes No

72 People

3 Questions

Start Doubt Session

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Type message

24 / 24

Q

$$\text{Var}(X) = \overline{E(X^2)} - [E(X)]^2$$

$$X^2: x_1^2, x_2^2, \dots, x_n^2$$

$$X: x_1, x_2, \dots, x_n \Rightarrow \text{Mean} = \bar{x}$$

$$\begin{aligned} \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2 &= \frac{1}{n} \sum_{i=1}^n (x_i^2 + \bar{x}^2 - 2\bar{x}x_i) \\ &= \left(\frac{1}{n} \sum_{i=1}^n x_i^2 \right) + \frac{1}{n} \sum_{i=1}^n \bar{x}^2 - \frac{1}{n} \sum_{i=1}^n 2\bar{x}x_i \end{aligned}$$

$$E(X^2)$$

$$\underline{E(X^2)} + \frac{1}{n} \sum_{i=1}^n (\bar{x})^2 - \frac{1}{n} \sum_{i=1}^n 2\bar{x} x_i$$

$$\cancel{n} \cdot \bar{x}^2 - 2\bar{x} \cdot \cancel{\frac{1}{n} \sum_{i=1}^n x_i}$$

$$\bar{x}^2 - 2\bar{x} \cdot \bar{x}$$

$$= -(\bar{x})^2$$

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$E(X^2) = \frac{1}{n} \sum_{i=1}^n x_i^2$

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$X: x_1, x_2, x_3 \dots x_n$

$X^2: x_1^2, x_2^2 \dots x_n^2$

Srikanth Varma Chekuri (You) (Screen)

01:08:44

00:00

72 People

Chat

4 Questions

Srikanth Varma Chekuri (You)

10:08 PM

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Vinay Araveeti

can we derive biased estimator of sampling mean variance please

Already Answered Answer Now

10:08 PM 0

GEOMRTT

Yes No

To: Everyone

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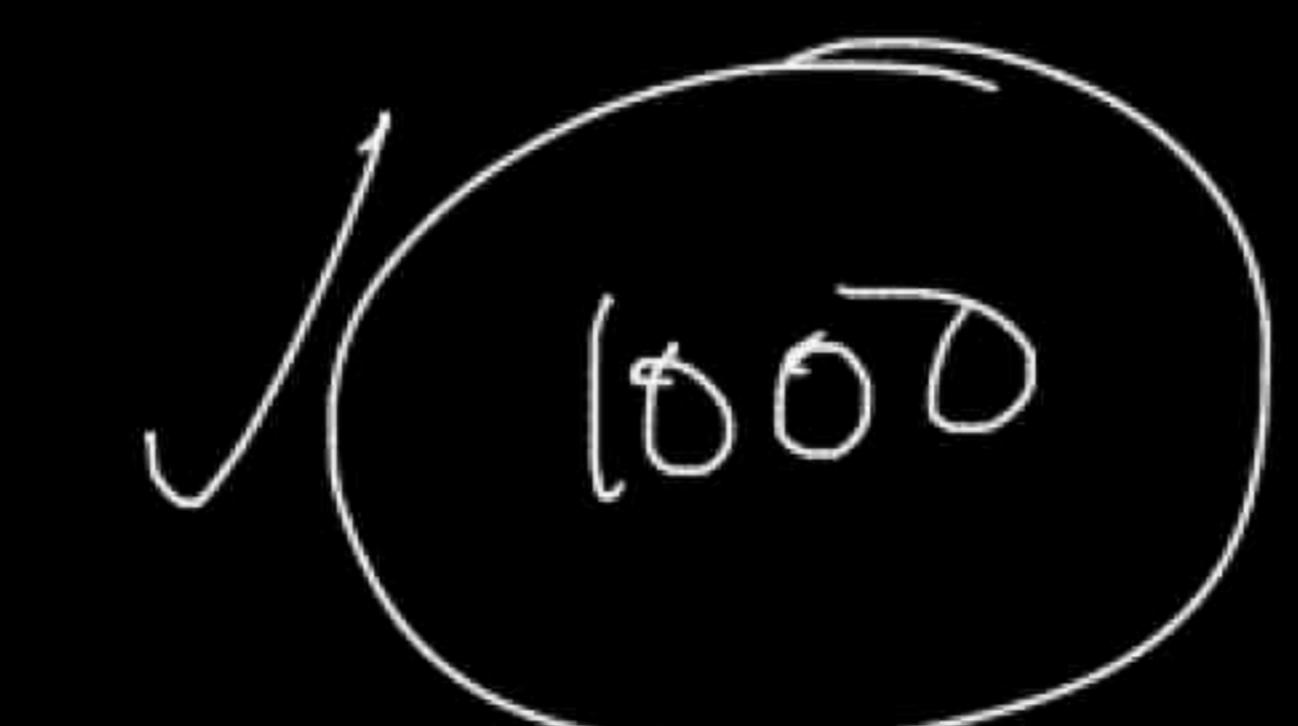
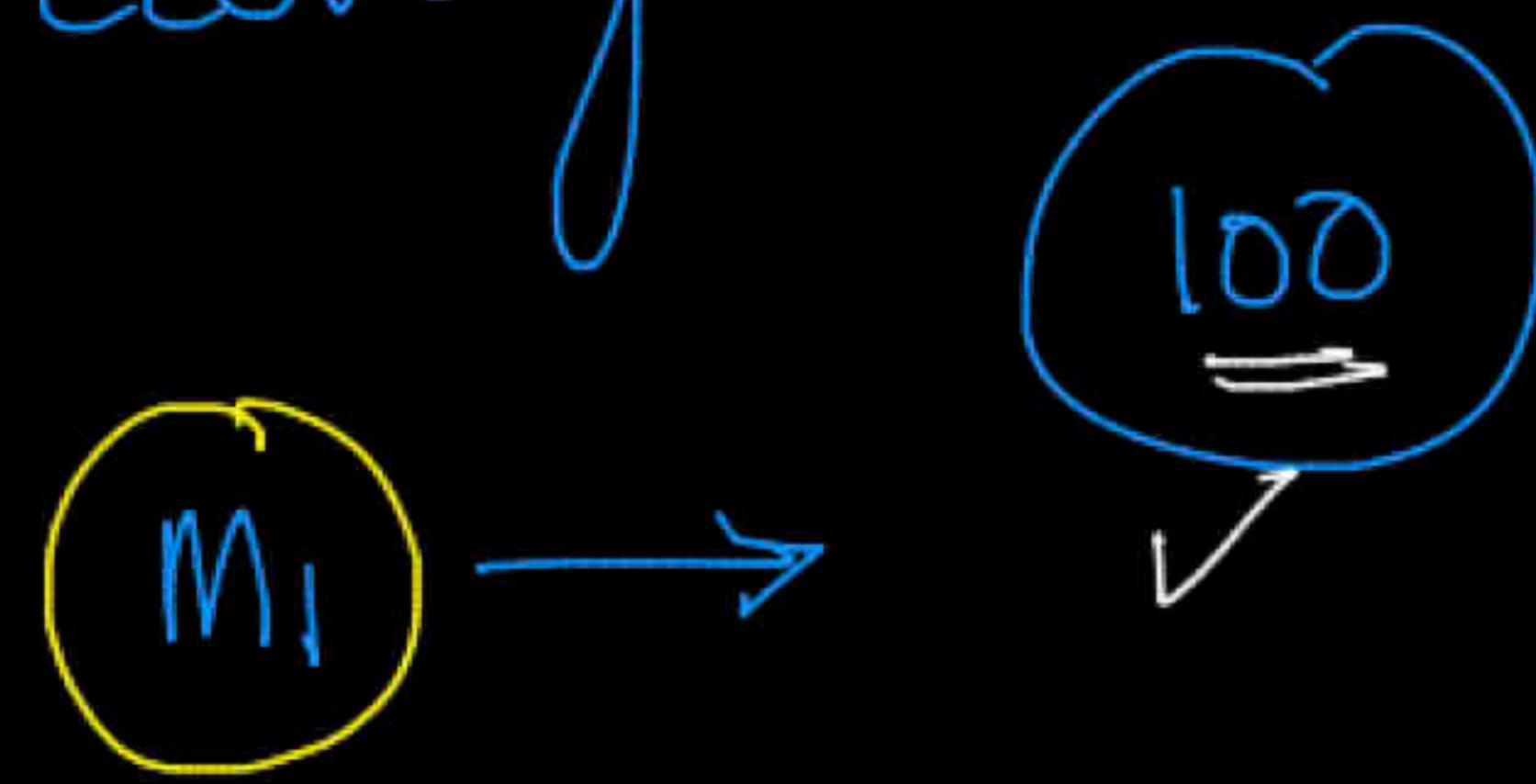
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27 / 27

C.J

width of the C.J

Covid - recovery time



as-y-C.J

Median-rec-time

$$\left[1.5, \underbrace{10.5}_{\text{8 days}} \right]$$

1day

$$\left[9.5, \underbrace{10.5}_{1day} \right] \checkmark$$

BS

∞ - Many obs \rightarrow $\begin{bmatrix} \text{width} \\ [10.0 \ 10.0] \end{bmatrix}$

~~population~~ median rec-time
of $M_1 \rightarrow$ 10 days

q5). (i) of Median rectangle

$$100 \rightarrow M_1 \rightarrow [7.5 \quad 10.5]$$

500 

$$\rightarrow [8.5 \quad 10.0]$$

$$120 \rightarrow M_2 \rightarrow [6.5 \quad 10.0]$$

600 

$$\rightarrow [7.0 \quad 9.0]$$



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X: non finite means var

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BS

Non-param stats

Parasit stats

CLTX

GEOMRTT

Srikanth Varma Chekuri (You) (Screen)

01:18:4

100%

31 / 31

00

Srikanth Varma Chekuri (You)

Questions

Live (4) Answered (1)

Recently asked

Note: Please click on "Answer Now" button before you start explaining the doubt to perfectly map it with the classroom video.

Saptak Sadhya

if CLT does not allow us to estimate the mean for such distributions having non finite mean or variance.. is bootstrapping used to estimate the mean for such cases?

You're answering now

Mark Answered

Asked 72 minutes ago

1 like 3

Start Doubt Session

70 People

2 Chat

4 Questions

✓ 100 obs
95% c.i of Median rec. time of M1

$$= [7.5, 10.5]$$

repeat it ∞ -Many times

avg. of the times, the
pop-Median lies
in this interval

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M₁: [7.5 10.5]

M₂: [6.5 9.5]

120 ↗

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Srikanth Varma Chekuri (You) (Screen)

01:24:1

100 ↗

500

530

800 ↗

Srikanth Varma Chekuri (You)

Chat

Notify me about Nothing

Phanendra K To: Everyone 10:23 PM

Pin a message +

Snehil Kumar To: Everyone 10:23 PM

m2

Arpan Srivastava To: Everyone 10:23 PM

m2

Krishna Chaitanya To: Everyone 10:23 PM

m2

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Yes No

To: Everyone Enable/Disable Chat

Type message

68 People

5 Questions

33 / 33

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Srikanth Varma Chekuri (You) (Screen)

01:27:2

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POP = $\{x_1, x_2, \dots\}$

$\eta = LM$

$S_1 \rightarrow$

$n \rightarrow$

$S_2 \rightarrow$

$S_Y \rightarrow$

$\gamma \uparrow$

$n \uparrow$

It is population

yes

will it converge to one point?

To: Everyone

Type message

Enable/Disable Chat

Start Doubt Session

Chat

Notify me about Nothing

Bishal To: Everyone 10:26 PM Pin a message

Abhinav Sharma To: Everyone 10:26 PM

Abhinav Sharma To: Everyone 10:26 PM

Soham Dhole To: Everyone 10:26 PM

68 People

4 Questions

GEOMRTT

Srikanth Varma Chekuri (You)

Start Doubt Session

Yes No

34 / 34

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DSML Adv: Remedial 2 | Lecture

Sample-size as large possible
↳ > 30

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GEOMRTT

Srikanth Varma Chekuri (You) (Screen)

01:28:3

00:00

35 / 35

Srikanth Varma Chekuri (You)

People 67

Chat 1

Questions 3

Questions

Live (3) Answered (5)

Recently asked

Note: Please click on “Answer Now” button before you start explaining the doubt to perfectly map it with the classroom video.

Sumanth

what's the ideal sample size to be taken for computing CI

You're answering now Mark Answered

Asked 8 minutes ago 0

Vinay Araveeti

could you please explain conceptual

Start Doubt Session

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GEOMRTT

CLT

Sample Mean $\sim N(\mu, \frac{\sigma}{\sqrt{n}})$

BS

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01:30:0

Srikanth Varma Chekuri (You) (Screen)

00

Srikanth Varma Chekuri (You)

Questions

Live (2) Answered (6)

Recently asked

before you start explaining the doubt to perfectly map it with the classroom video.

Vinay Araveeti

could you please explain conceptual difference between CLt and bootstrapping, I understand CLT is for mean and other things like median etc can be calculated using bootstrapping.

You're answering now

Mark Answered

Asked 6 minutes ago

1

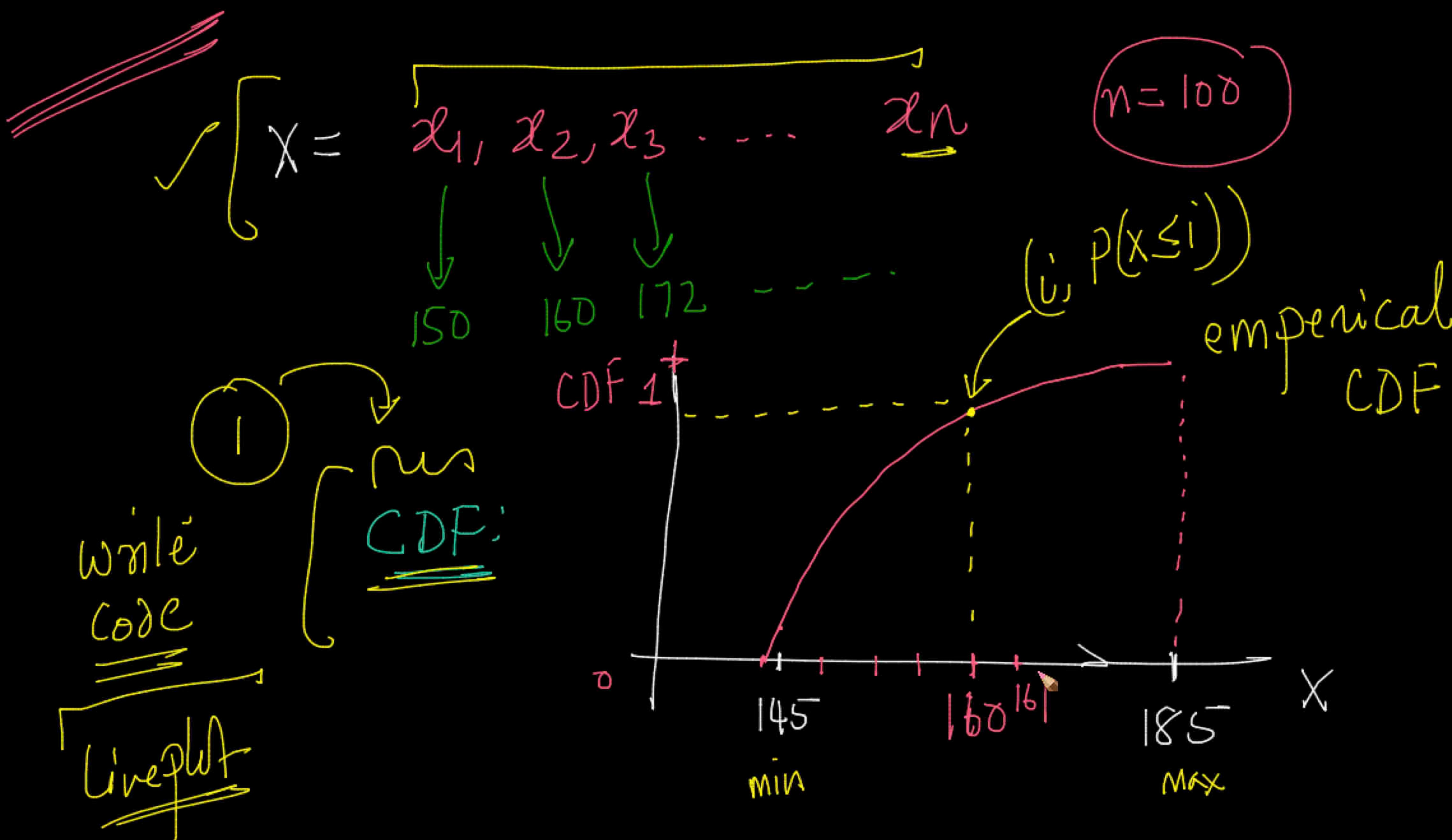
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Resham Srivastava

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Chat

2 Questions

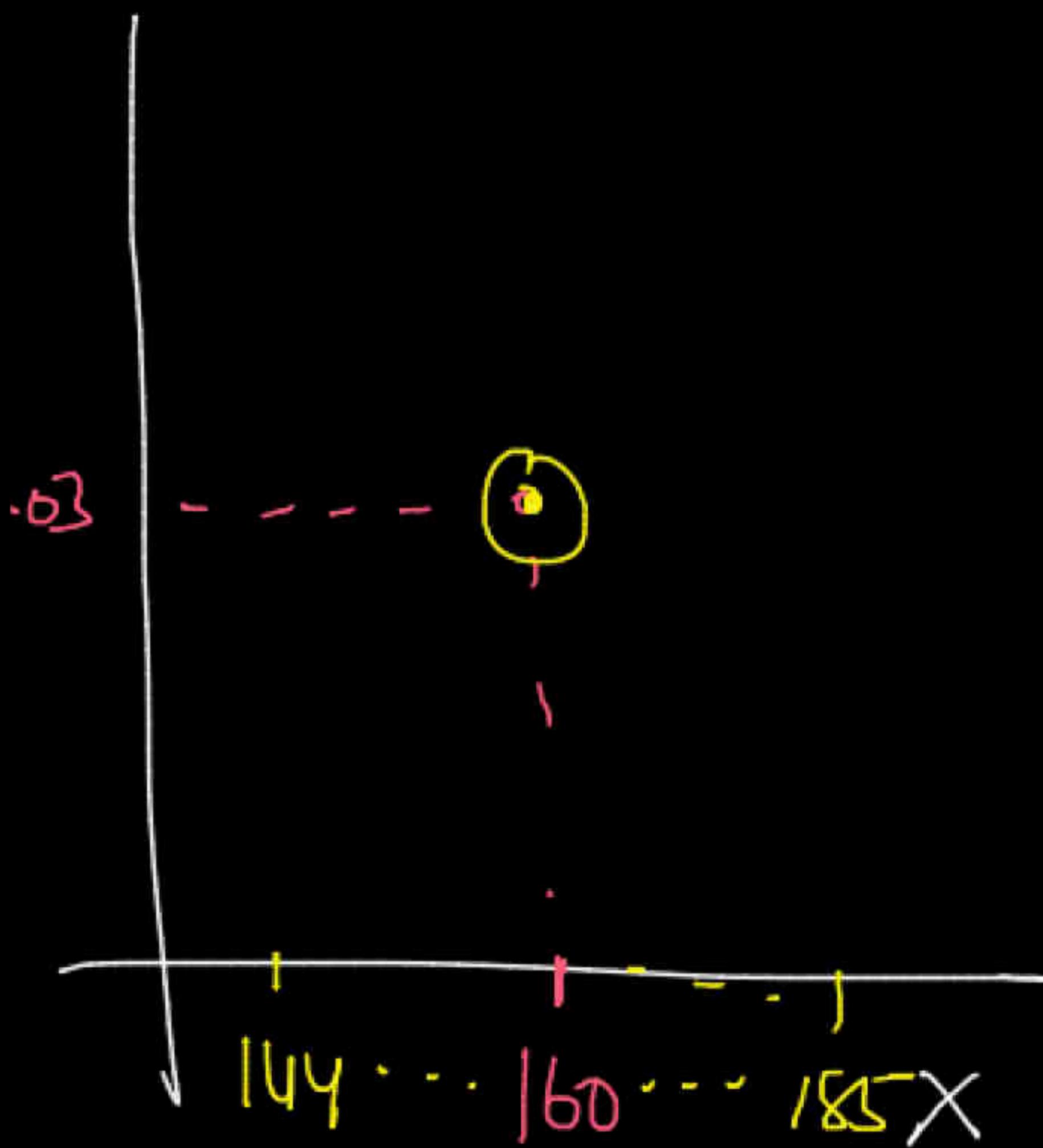
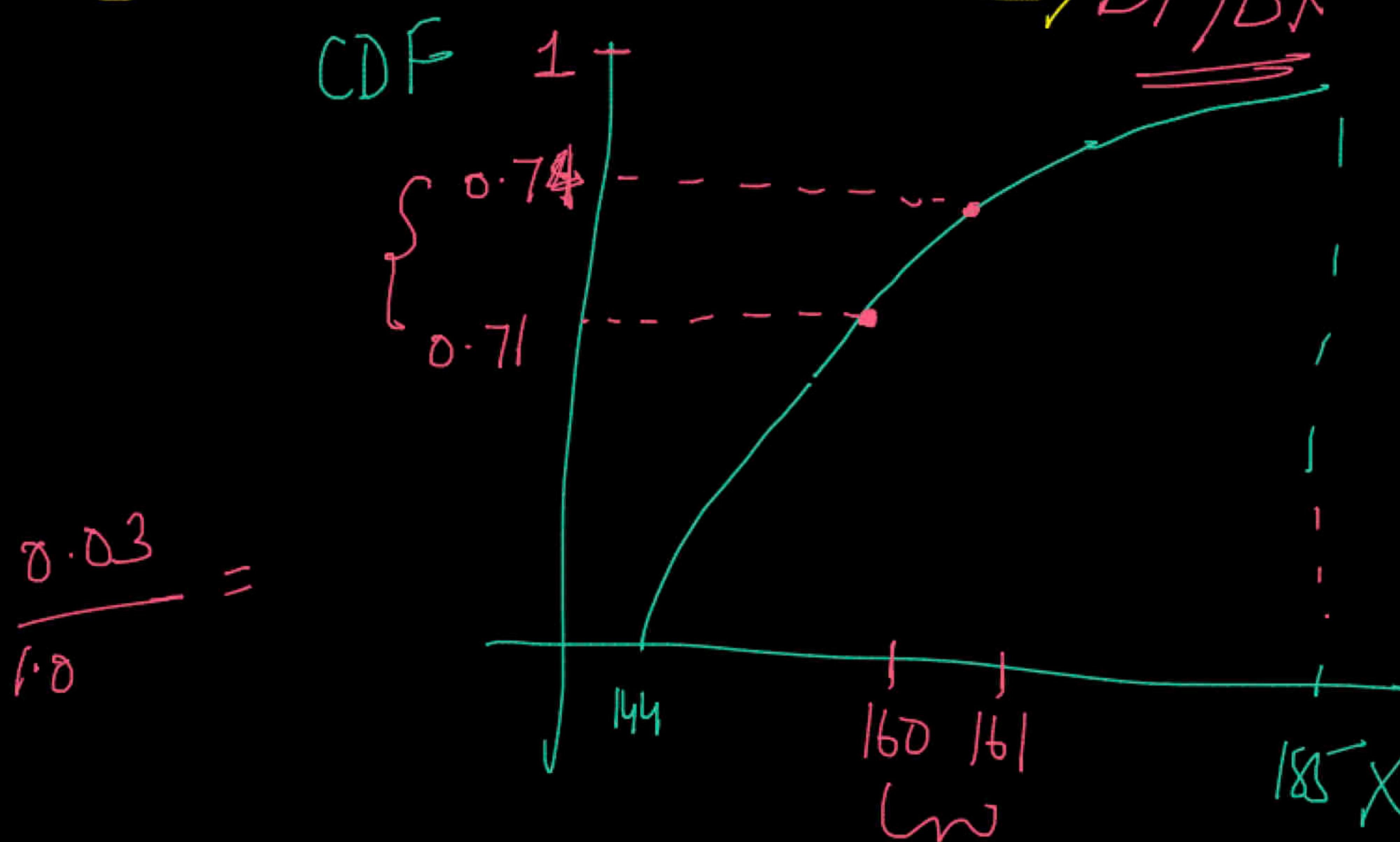


2

PDF: derivative of CDF

$$\frac{dy}{dx}$$

PDF



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X: Continuous

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Y-V

00

Srikanth Varma Chekuri (You)

Chat

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Abhishek Sharma To Everyone 10:38 PM

Pin a message +

10:38 PM

5

Phaniteja To Everyone 10:38 PM

dice

Indradip Gupta To Everyone 10:39 PM

smiling baby :D

GEOMRTT Yes No

To: Everyone Enable/Disable Chat

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2 Questions

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01:38:4

39 / 39

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Male → outliers

female → outliers

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all: →

Outliers

Srikanth Varma Chekuri (You)

Questions

Live (1) Answered (9)

Recently asked

Riju Kar

suppose there are two categories in recovery time ,male and female and i need to find the CI of each of them, i did the boxplot and found that in the overall recovery time data there are lot of outliers ,so i removed them ,but is it necessary to also treat the outlier each for female and male before calculating their Corresponding CIs for the mean recovery time?

You're answering now

Mark Answered

Asked 5 minutes ago

10:43:0

68 People

Chat

1 Questions

Start Doubt Session

~~Two~~

$X: x_1, x_2, \dots, x_n$

Expected value

$$E(X) = \frac{1}{n} \sum_{i=1}^n x_i \rightarrow \text{Math}$$

Life "expectedly"

~~72 yrs~~

"expected" in English

↳ expected # weeks of a human

pregnancy

↳ ~~36~~

$$E(X) = \dots$$

algebraically

X84

$$E(X+Y) = \dots$$

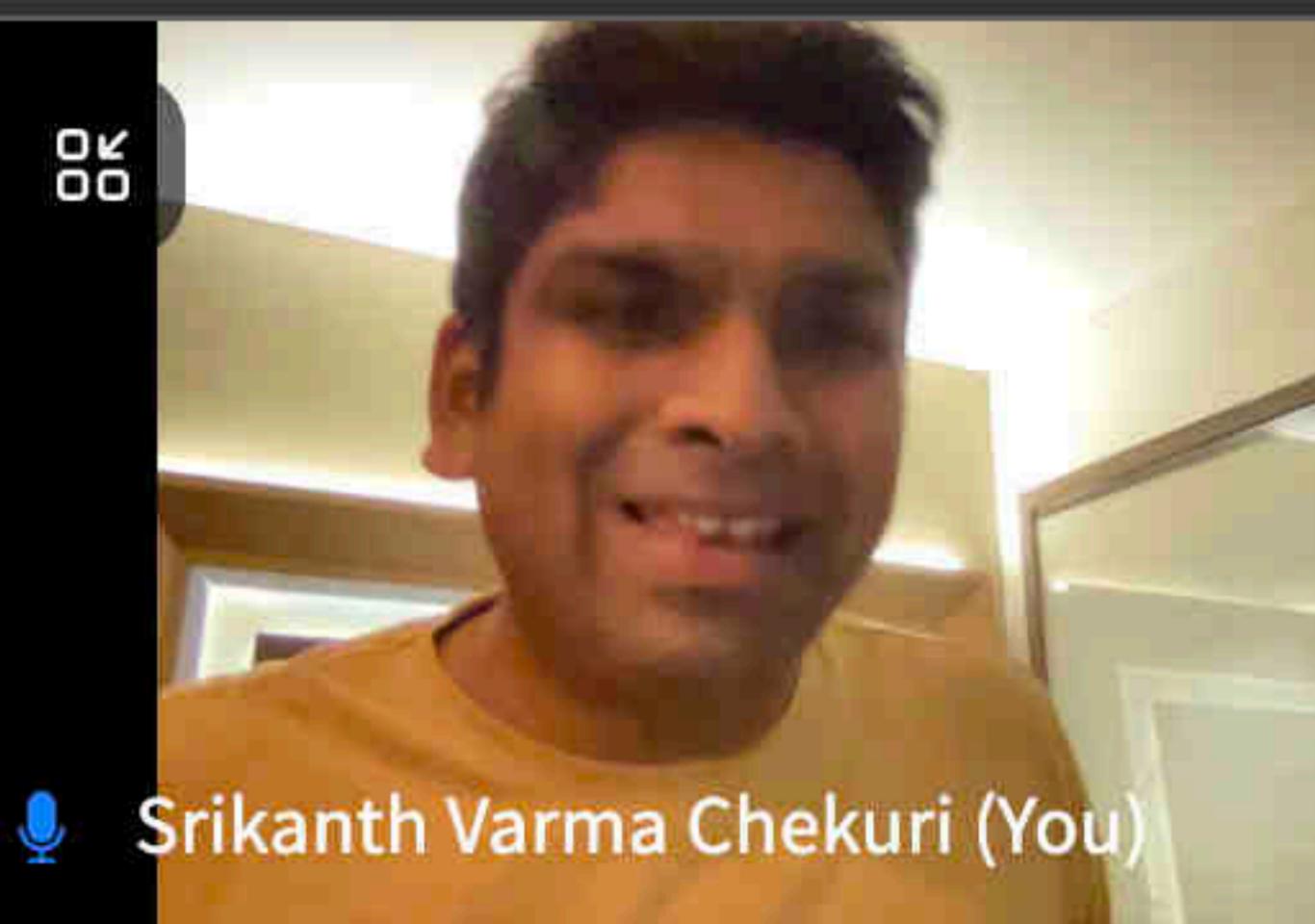
runs that
Indian Team
scores in
WC



Axithmelić mean = $E(X)$

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Chat

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Nothing

10:50 PM

Pin a

Pin a message

Anand Kumar Azad

Sir, Then how come Mean is different from expected value?

 You're answering now

10:52 PM

10

10:52 PM

GEOMRIT

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01:52:5



3 / 43



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X: x_1, x_2, \dots, x_n

$E(X) = \frac{1}{n} \sum x_i$

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GEOMRTT

Srikanth Varma Chekuri (You) (Screen)

01:54:3

5 6 7 8 9 T 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 / 44

80 00

Srikanth Varma Chekuri (You)

65 People

2 Chat

1 Questions

Questions

Live (1) Answered (11)

Recently asked

Note: Please click on “Answer Now” button before you start explaining the doubt to perfectly map it with the classroom video.

Saptak Sadhya

isn't this formula for expectation only valid for a random variable where each value is equally likely?

You're answering now

Mark Answered

Asked 3 minutes ago

1 0

Start Doubt Session



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X: {2, 3, 2, 1}

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 Srikanth Varma Chekuri (You)

Questions

Live (1)

Answered (11)

 Recently asked

Note: Please click on “Answer Now” button before you start explaining the doubt to perfectly map it with the classroom video.

Saptak Sadhya

isn't this formula for expectation only valid for a random variable where each value is equally likely?

 You're answering now

Mark Answered

GROUP 1

 Srikanth Varma Chekuri (You) (Screen)

Asked 3 minutes ago

1 0



discrete

$$\checkmark E(X) = \sum_i i \cdot p(X=i)$$

p.m.f

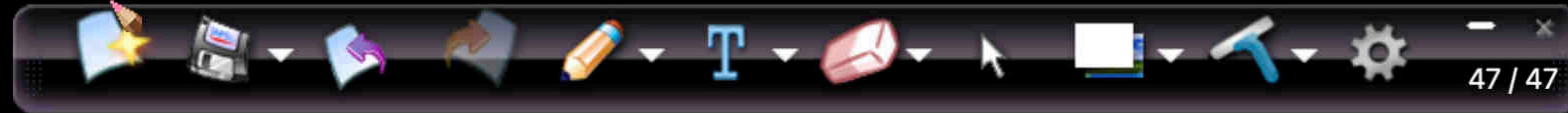
x → =

Conti

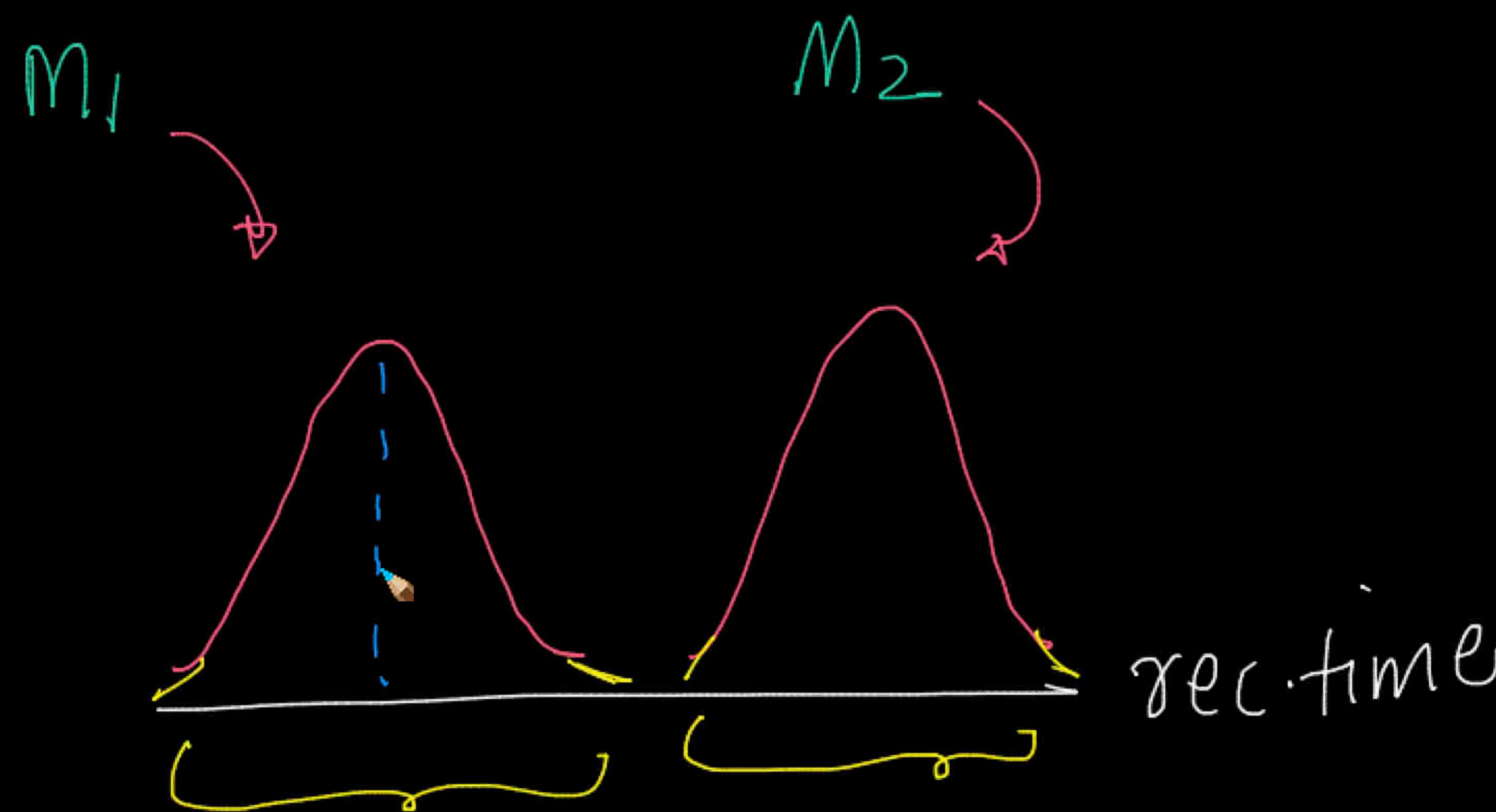
$$\int x \cdot p(x)$$

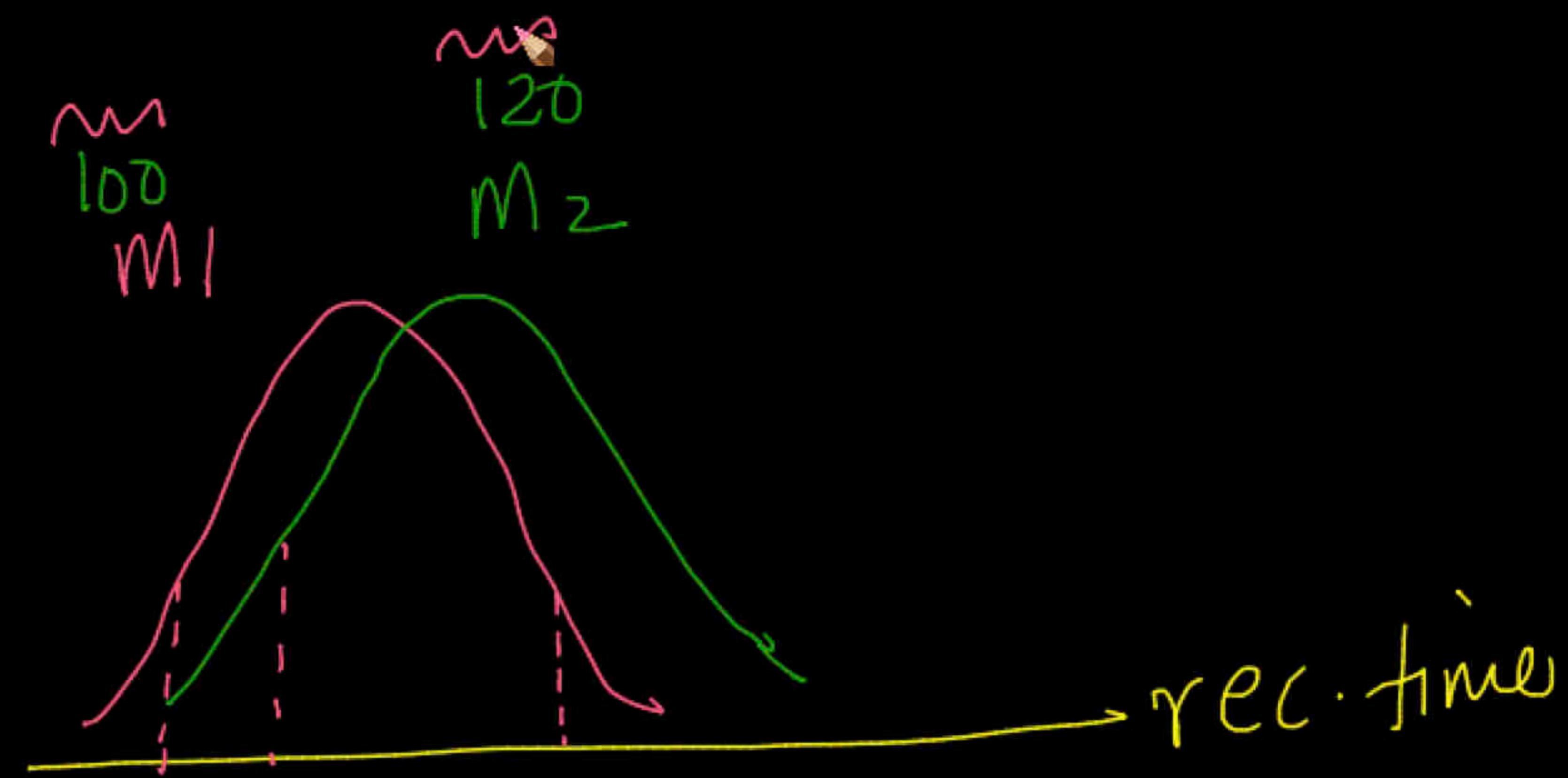
c.p.d.f

$$\left\{ \begin{array}{l} x_1, x_2, \dots, x_n \\ E(X) = \frac{1}{n} \sum_{i=1}^n x_i \end{array} \right.$$



PDF





rec. times M_1 & M_2

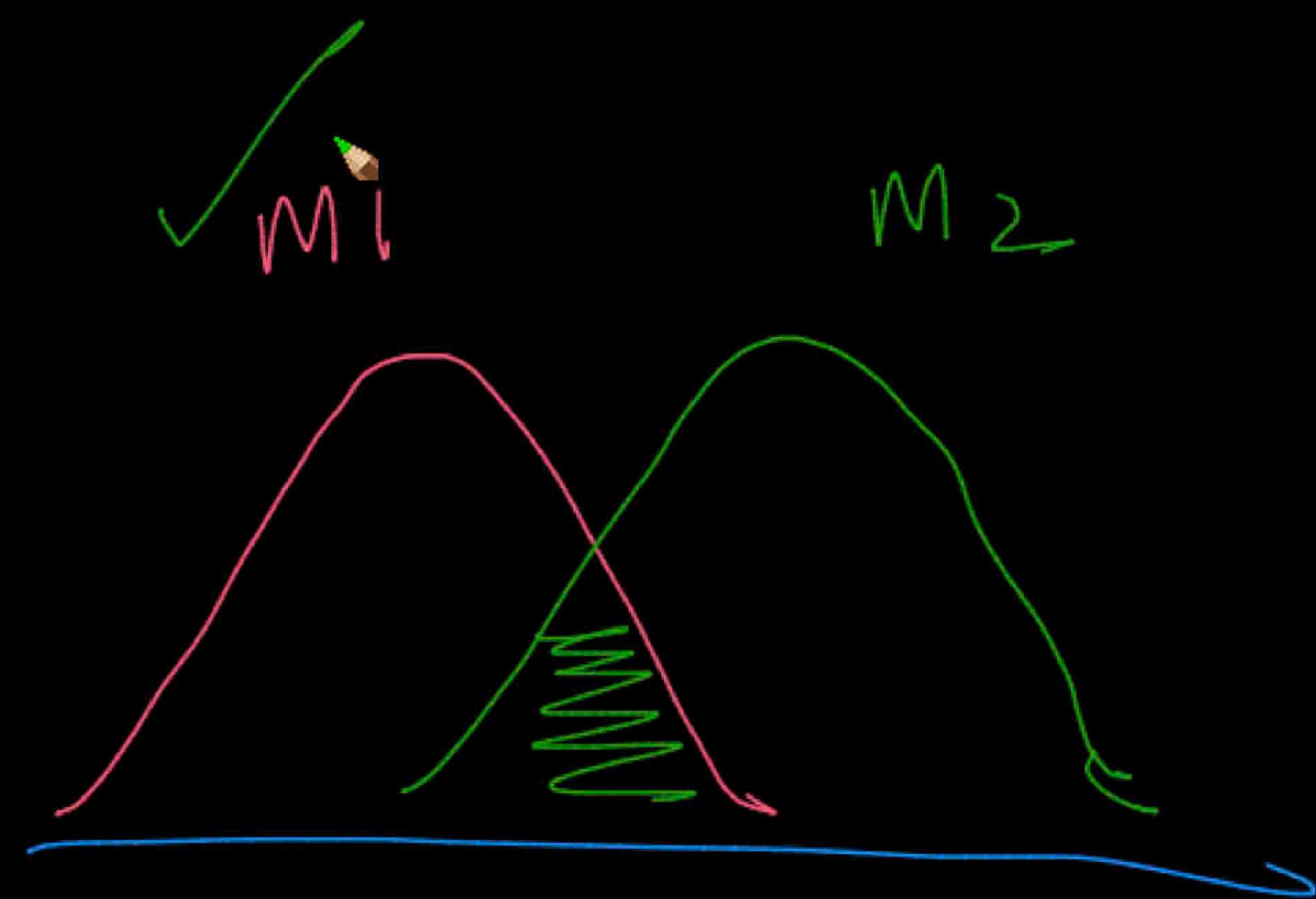


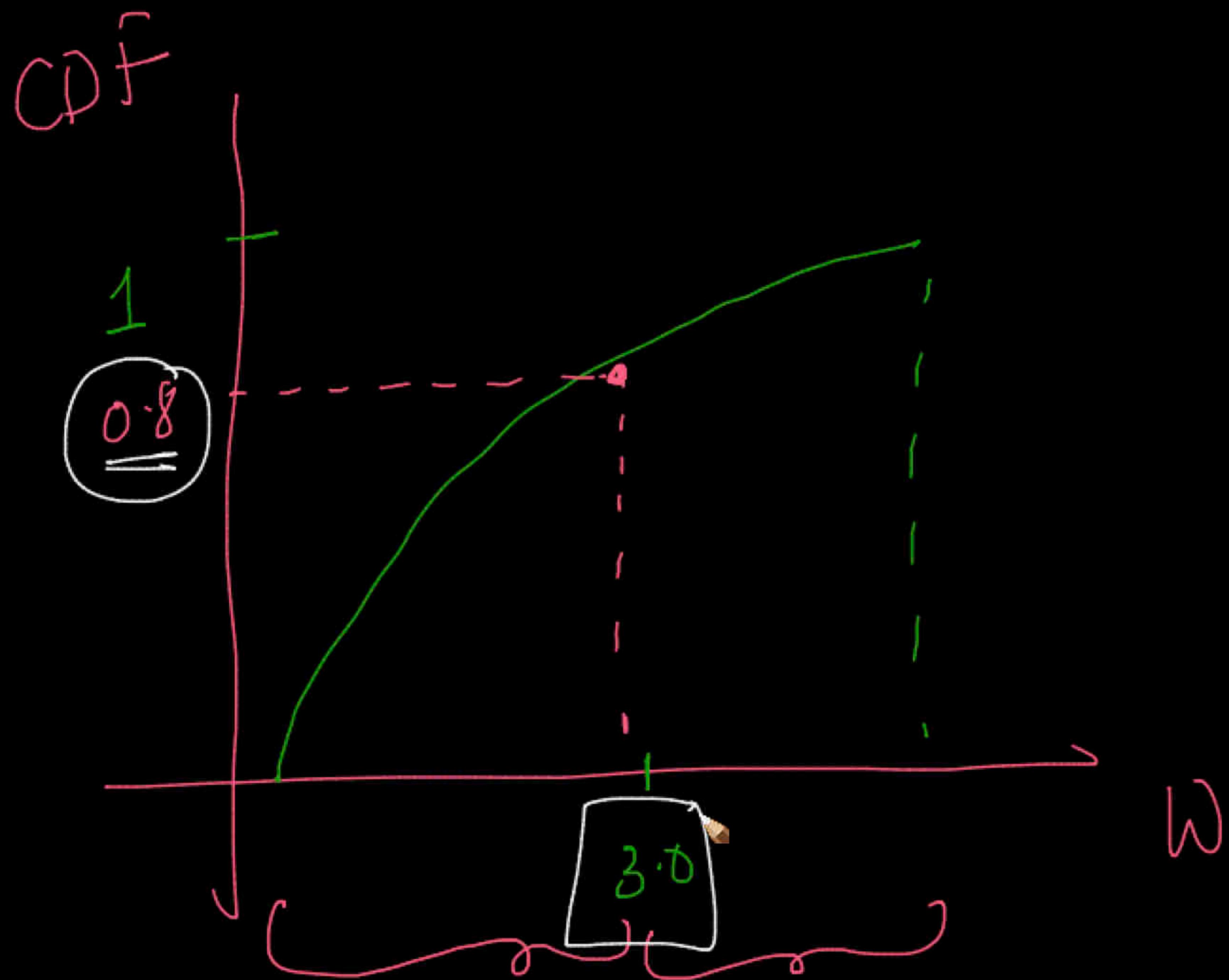
{ ① { mean rec. times }
median rec. times } point est

{ ② C.I.

③ PDFs

→ ✓ all β like Dale





KS - (est)
(latency)

Two parallel lines at the top left of the page.

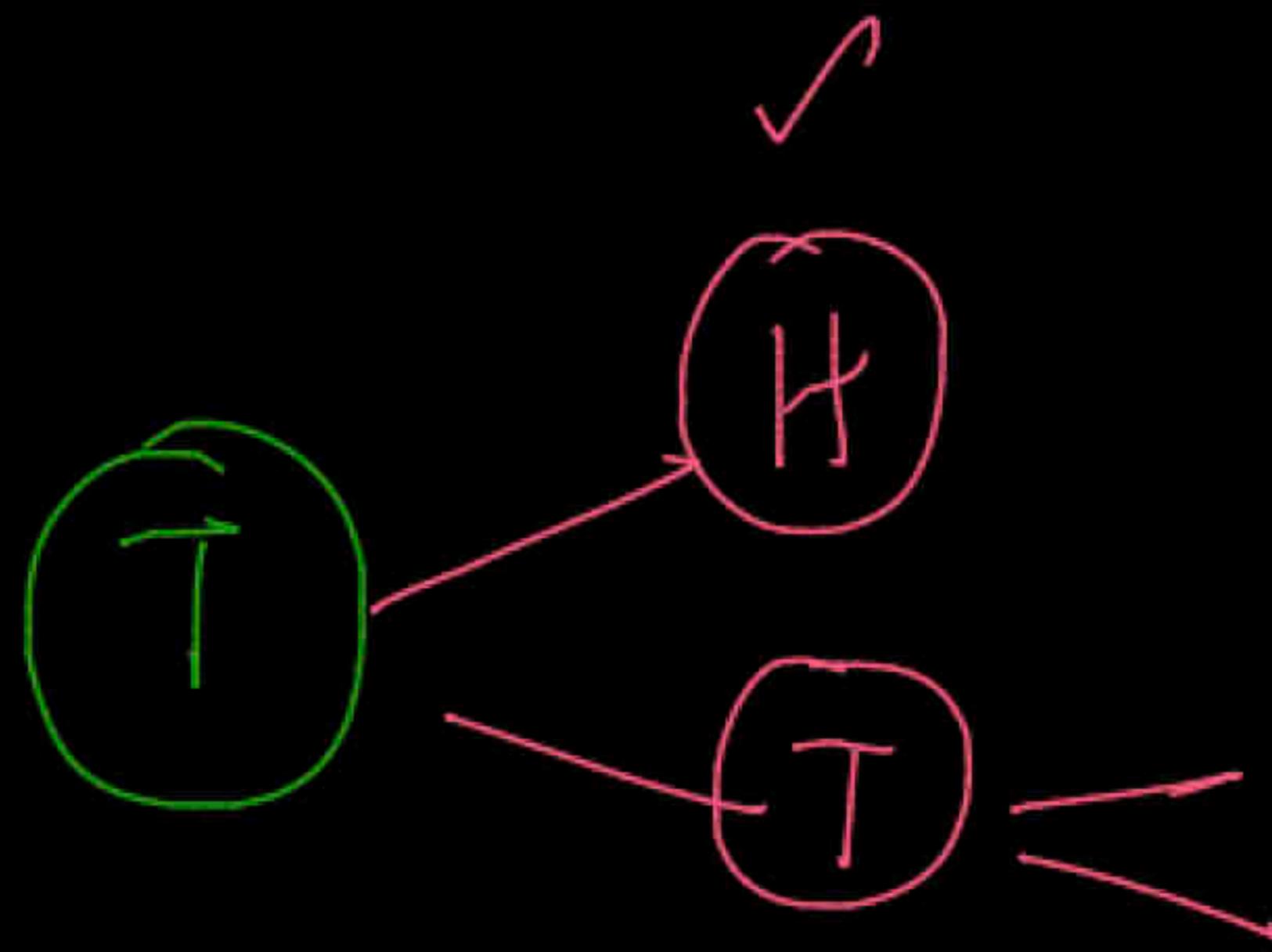
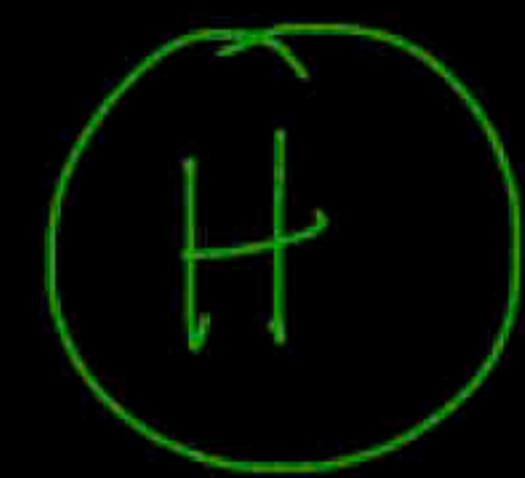
Until

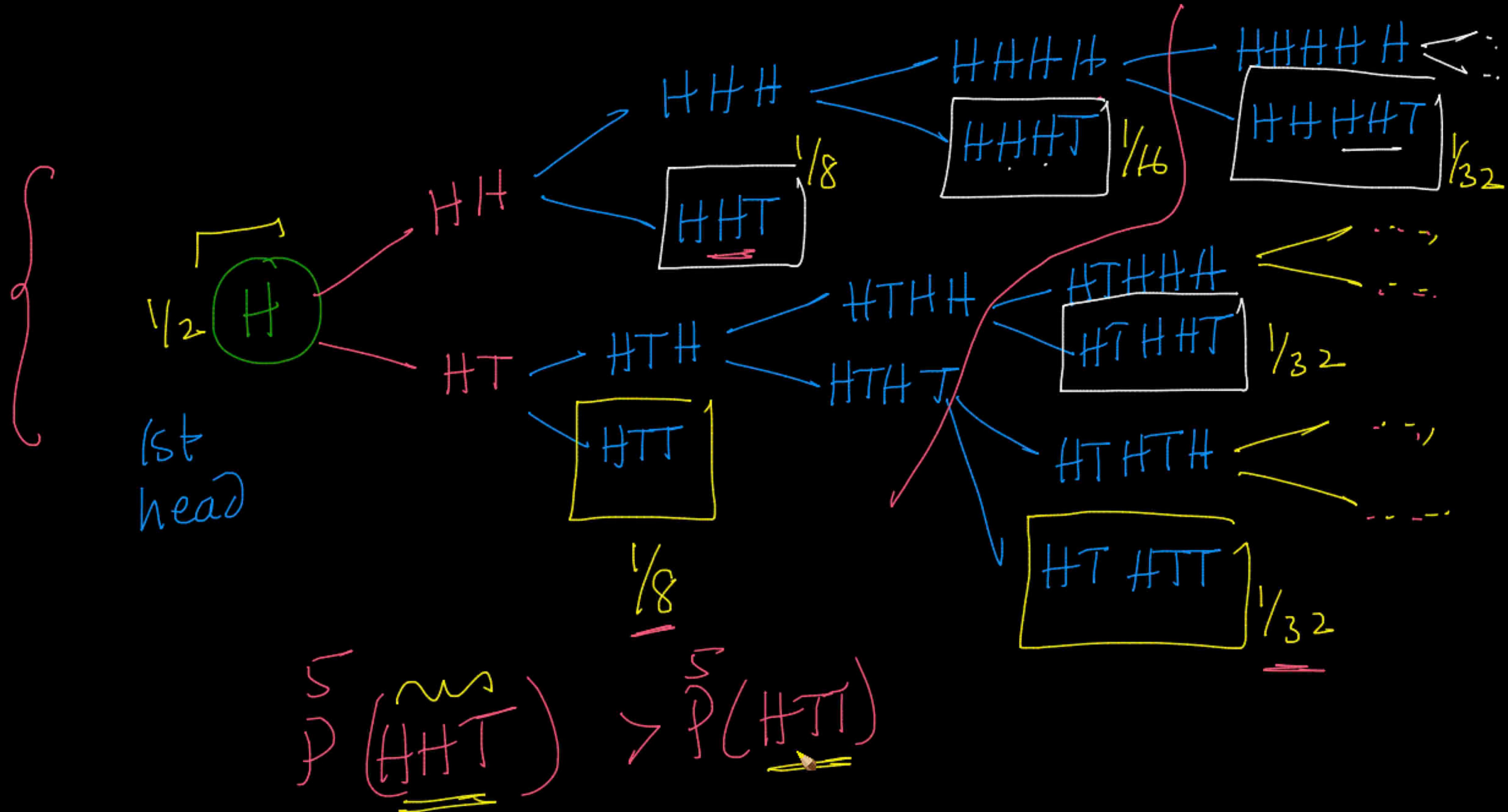
$\overbrace{HHT}^{\text{wavy}}$

\downarrow
 $\overbrace{HTT}^{\text{wavy}}$

repeated tosses

more likely





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GEOMRTT

Srikanth Varma Chekuri (You) (Screen)

02:13:3

55 / 55

61 People

Chat 2 Questions

Srikanth Varma Chekuri (You)

Chat

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11:13 PM

● Sunny Panchal To: Everyone 11:13 PM
wow !

● Phaniteja To: Everyone 11:13 PM
given first is head

11:13 PM

3

Start Doubt Session

Yes No

To: Everyone Enable/Disable Chat

Type message

55 / 55

11:13 PM

Start Doubt Session

Yes No

To: Everyone Enable/Disable Chat

Type message

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Srikanth Varma Chekuri (You) (Screen)

02:15:2

56 / 57

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Observe HFT before HTT

GEOMRTT

Srikanth Varma Chekuri (You)

Chat

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Mehul Bhuva To: Everyone 11:14 PM

layman method is more powerful than formula

Mehul Bhuva To: Everyone 11:15 PM

yes

Start Doubt Session

Enable/Disable Chat

Type message

62 People

Chat

Questions 2

You have left the meeting

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Notes written by you helps in understanding the topic better. You can upload the notes in two simple steps mentioned below

- 1 Scan the QR code with your iPad**
Scanner should be present in the top menu on your iPad
 - 2 Upload Notes on the generated link**
All notes uploaded will be visible in the saved version of this session



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