Prob. distribution fs

Random Variable

Discrete

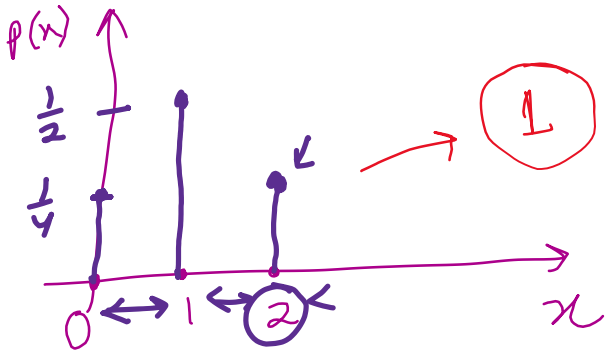
Limit

Continuous.

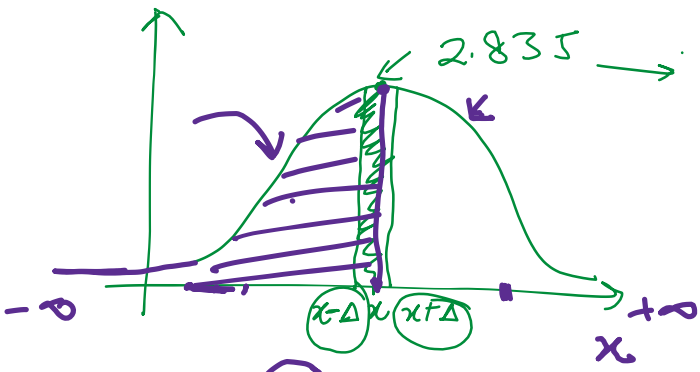
→ Sample space = {HH, HT, TH, TT}

→ Event : no. of heads in the toss of 2 Coins

x	0	1	2
p(x)	1/4	2/4 = 1/2	1/4



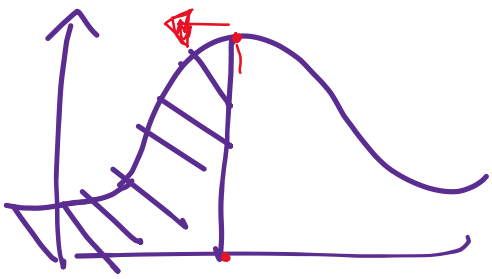
Plotted the probabilities.



CDF = $\int_{-\infty}^{x}$ pdf

= Area.

PDF = Probability density fn



Area = 0

PMF → Probability Mass function

↓

CDF = (Cumulative) distribution "

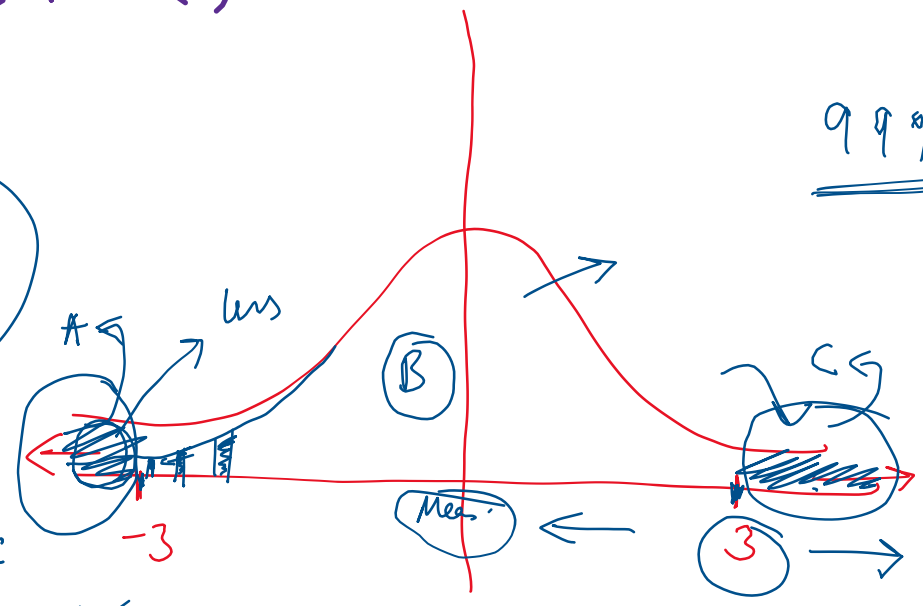
$$CDF(x=1) = PMF(0) + PMF(1)$$

$$= \sum_{0}^{1} PMF(x)$$

① Z-Score :

$$CDF(-3) = \int_{-\infty}^{-3} PDF$$

$$CDF(+3) = \int_{-\infty}^{3} PDF$$



$$1 - CDF(+3)$$

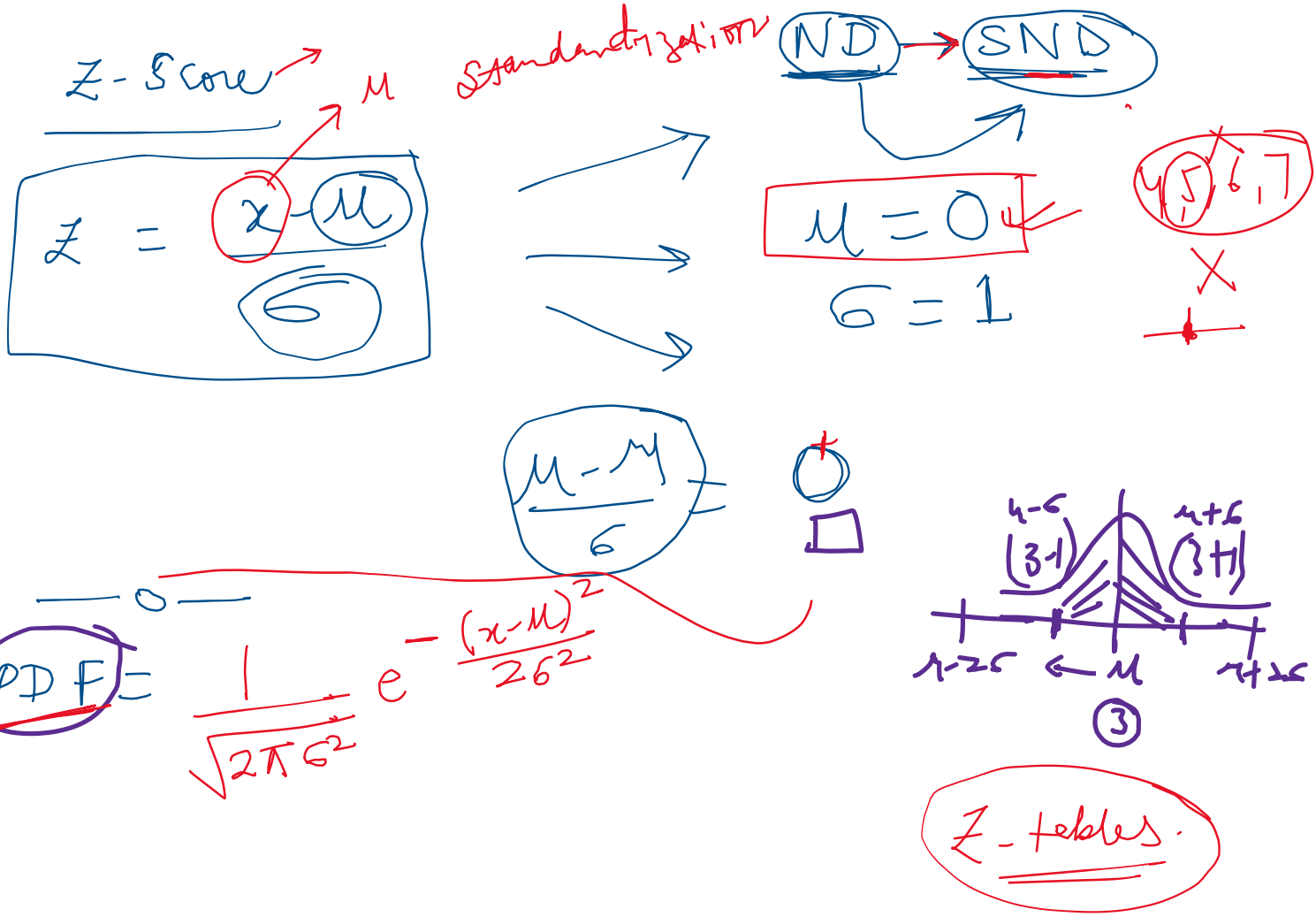
$$A + B + C = 1$$

$$CDF(-3) + B + (1 - CDF(3))$$

$$(A + B) + C = 1$$

$$CDF(3) + C = 1$$

$$C = 1 - CDF(3)$$



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within 1 SDL, 1 SDR $\Rightarrow$ 68%

2 " " $\Rightarrow$ 95%

3 " " $\Rightarrow$ 99.7%

P.F.

CDf = $\int$ PDF

$= \int_{\mu-\sigma}^{\mu+\sigma} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$

① Empirical

ND → SND

$\mu = 0, \quad \sigma = 1$

$= \int_{\mu-\sigma}^{\mu+\sigma} \frac{1}{\sqrt{2\pi}} e^{-x^2/2}$

$\approx 68\%$

$= \int_{-1}^{1}$ " $= 68.2689\%$

$\int_{-2}^{2}$ " $= 95.44\%$

$$\int_{-3}^{3}$$

$= 99.73\%$

$\simeq 0.9973$

How Empirical formula works? ⟵

Rule

$\mu =$

$\sigma =$

$\mu = 0$

$\sigma = 1$

Q. 2 neighbours → Maths ≅ ND (60, 4)
English ≅ ND (79, 2)

Sharmaji → Happy → 65 Marks in Maths

Vermaji → Ekta → 80 Marks in English

Mathematically,

Ekta > Happy

Statistically ?

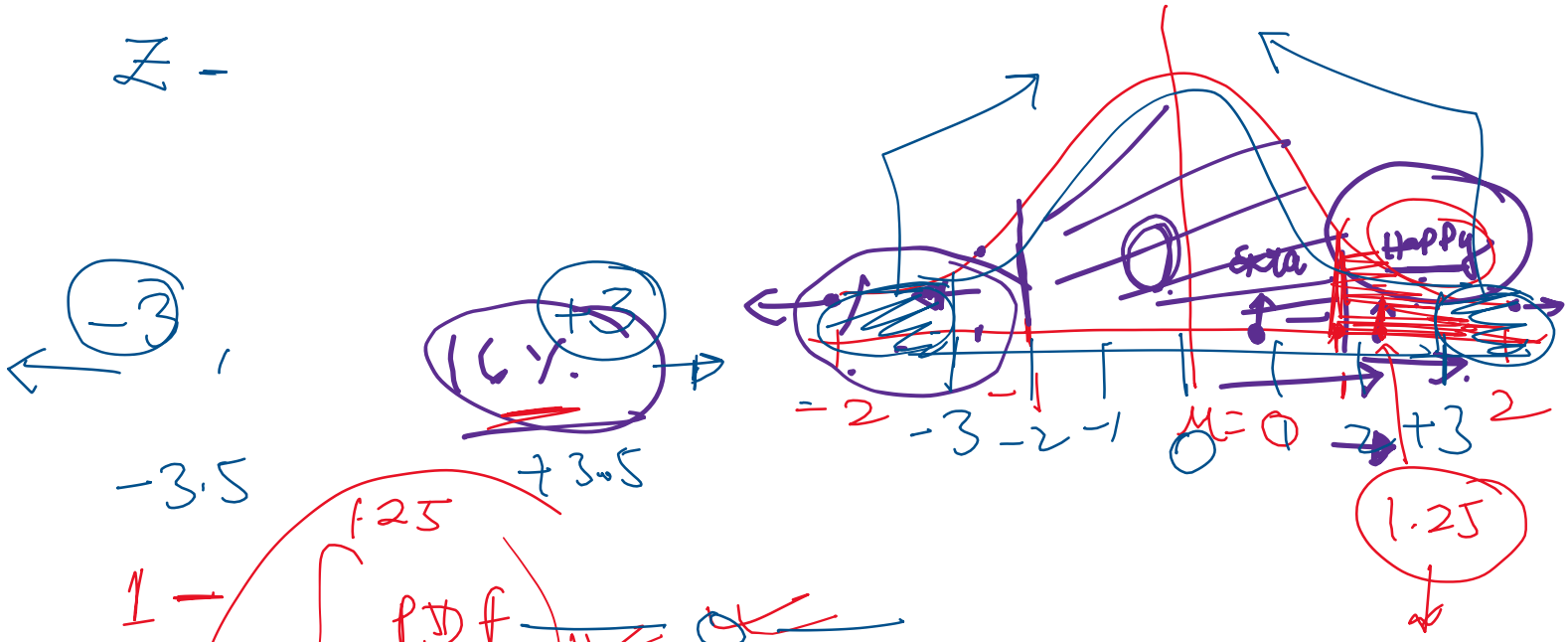
Q. Why we cannot compare ? like this

Standardization

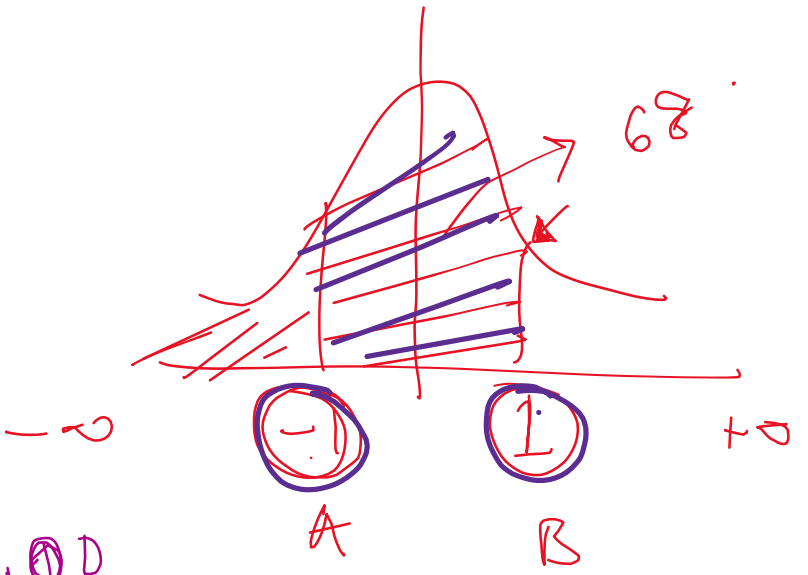
$$(Z\text{-score})_{Happy} = \frac{x-\mu}{\sigma} = \frac{65-60}{4} = \frac{5}{4} = 1.25$$

$$(Z)_{Ekta} = \frac{80-79}{2} = \frac{1}{2} = 0.5$$

Z -



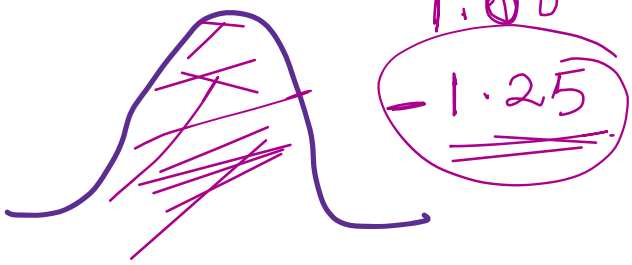
$1 - \int_{-\infty}^{1.25} PDF$



-1

$z(-1) = 0.15866$

$z(1) = 0.84134$



1.00

-1.25

$\int^{1}$

$-\int^{-1}$

10%

① Empirical Formula
& from where it came ?

(68, 95, 99.7) → 3-σ Rule

99% → 0.68

② PMF, PDF & CDF } Prob. distribution

③ Prob & % → ∫

④ standardization → need?

⑤ Z-table

CLT

Any distr. → N.D.

N.D → SND