Eg:- A small business recieve an average 12 customer per day, what is the probability that the business will recieve exactly 8 customer.

Soln:-

$\lambda = 12$

$x = 8$

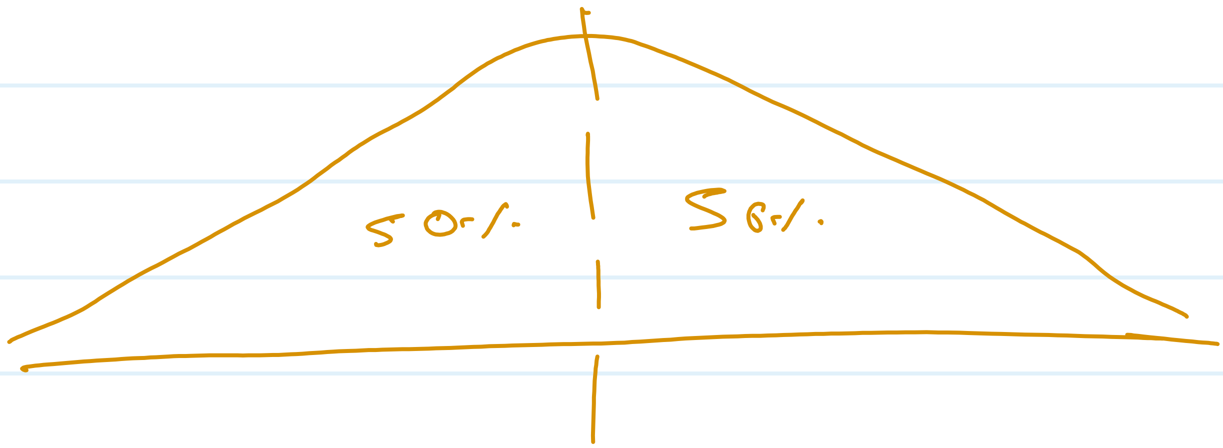
$$= \frac{e^{-12} \, 12^{8}}{8!}$$

$= 0.0655 \times 100$

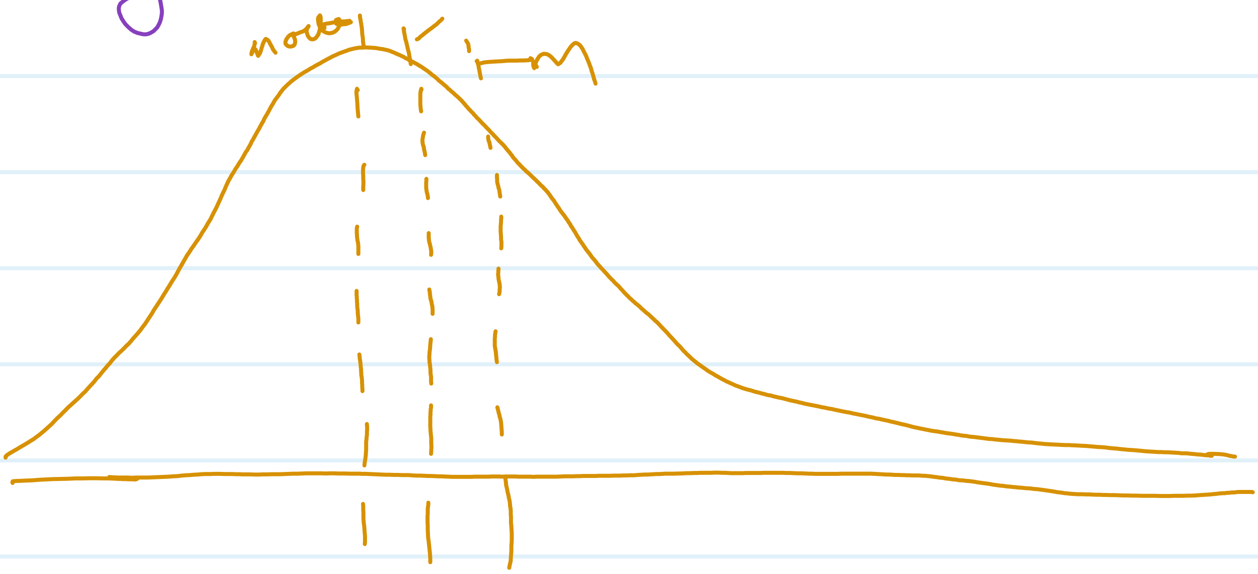
$\Rightarrow 6.5\%$

* Continous probability dist.

① Normal Dist.



⑪ Log Normal Dist.



(III) standard Normal Dist.

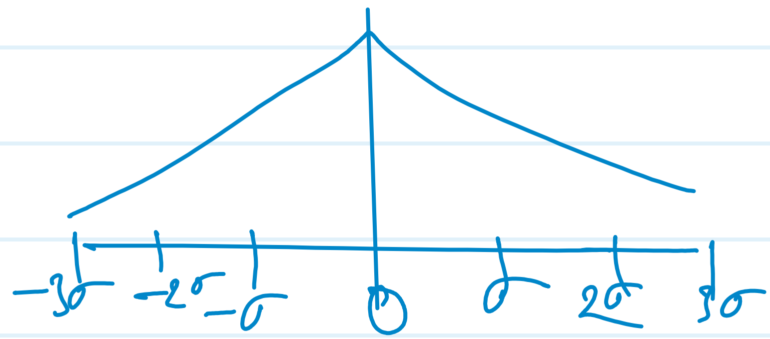
$\mu = 0, \sigma = 1$

$$Z\text{score} = \frac{x_i - \mu}{\sigma}$$

Dataset = [1, 2, 3, 4, 5, 6, 7]

$\mu = 0$

$\sigma = 1$



$\underline{\text{Sol}^n} \Rightarrow \quad \mu = 4$

$\sigma = 2$

(1) $$Z = \frac{x_i - \mu}{\sigma} = \frac{1-4}{2} = -1.5$$

(2) $$\frac{2-4}{2} = -1$$

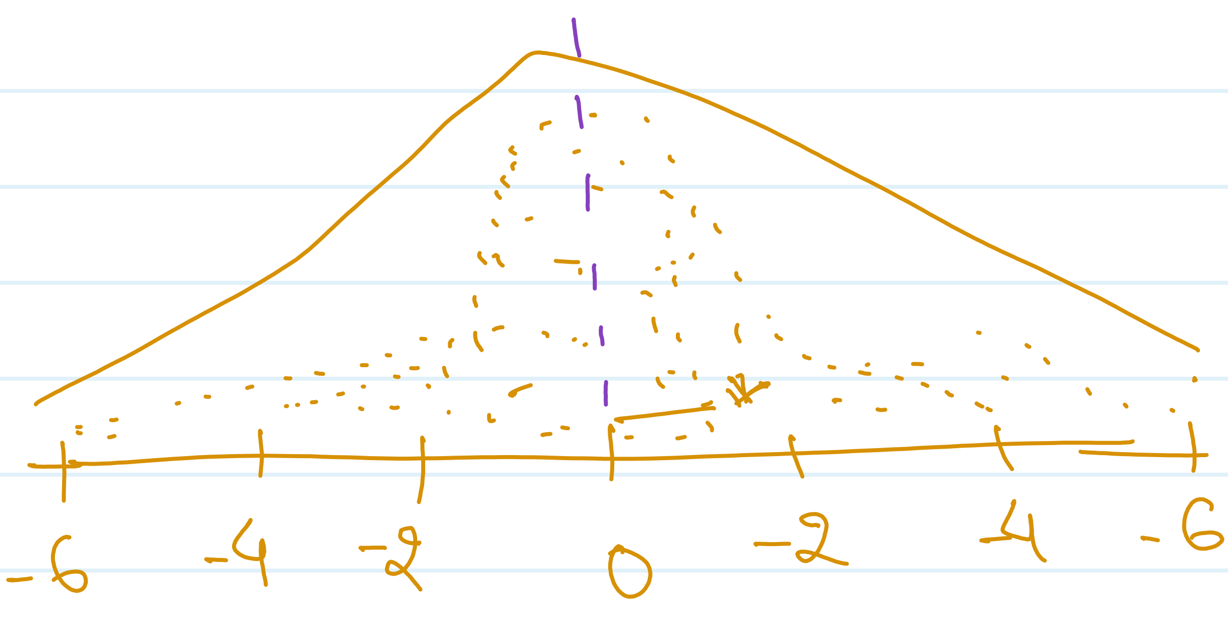
③ $\frac{3-4}{2} = -0.5$

④ $\frac{4-4}{2} = 0$

⑤ $\frac{5-4}{2} = 0.5$

⑥ $\frac{6-4}{2} = 1$

⑦ $\frac{7-4}{2} = 1.5$



$1 - 10$ ✓ $\qquad \underline{0 - 1}$

$100 - 1000$ ✓

$1000 - 10000$ ✓

$10000 - 100000$

$$\frac{1}{100000} \qquad \frac{10^{-5}}{} \qquad \frac{10000}{100000} = 10^{-1}$$

$$\frac{1000}{100000} = 10^{-2}$$

$10^{-3} \Rightarrow 0.001$

$10^{-5} = 0.00001$

$10^{-1} \Rightarrow 0.1$

$\Rightarrow 0.001$

$\boxed{0 - 1}$

Center Limit theorem

population ⇒ 

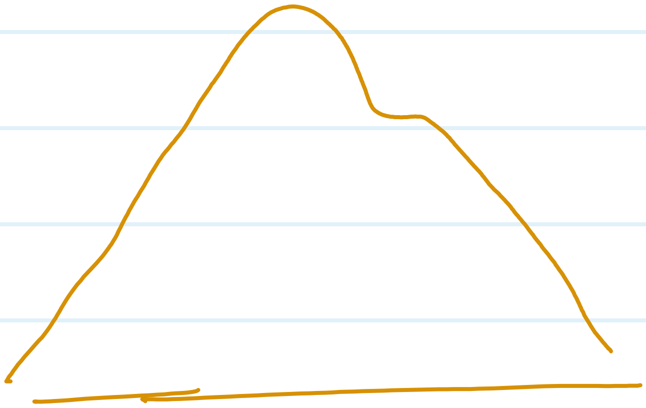
① sample size ≥ 30

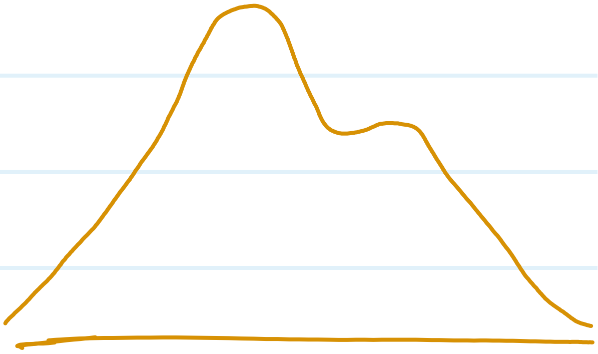
② sample mean $\bar{X}$

③ more sample highest chance to normal dist.

40 sample $= [n_1, n_2 \; - - - - \cdot \cdot \; n_{40}]$

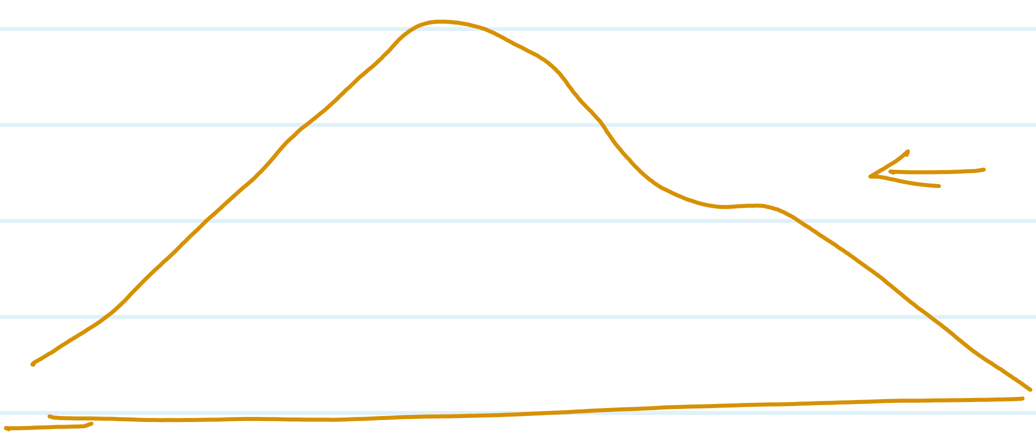
40 mean $= [\bar{X}_1, \bar{X}_2 \; - - - - \; \bar{X}_{40}]$

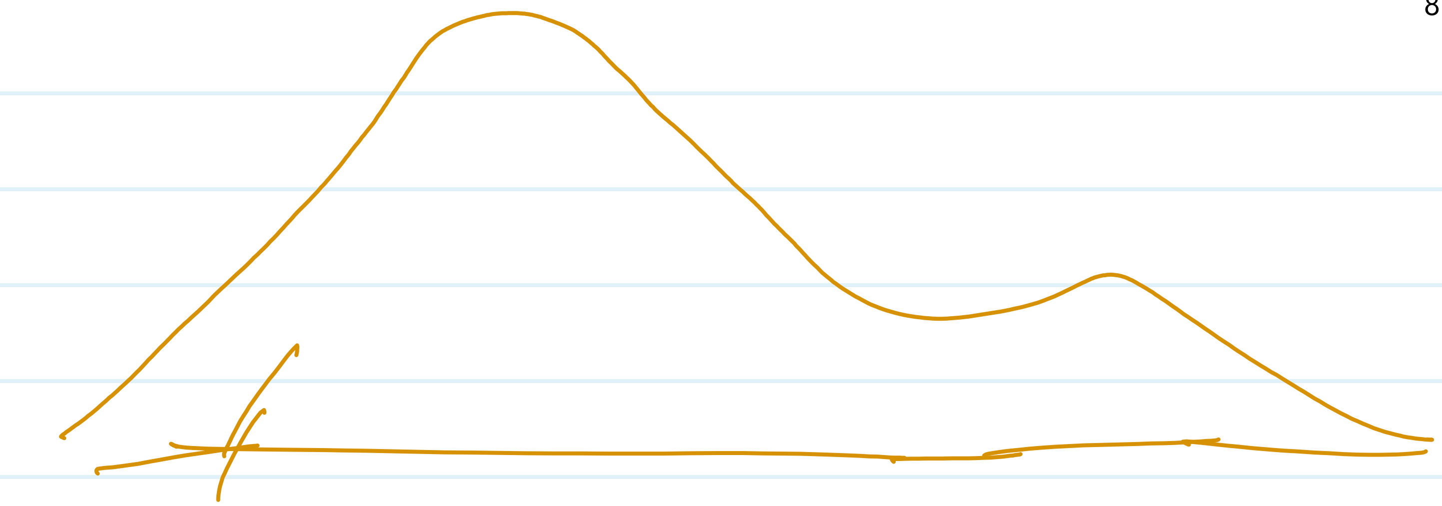




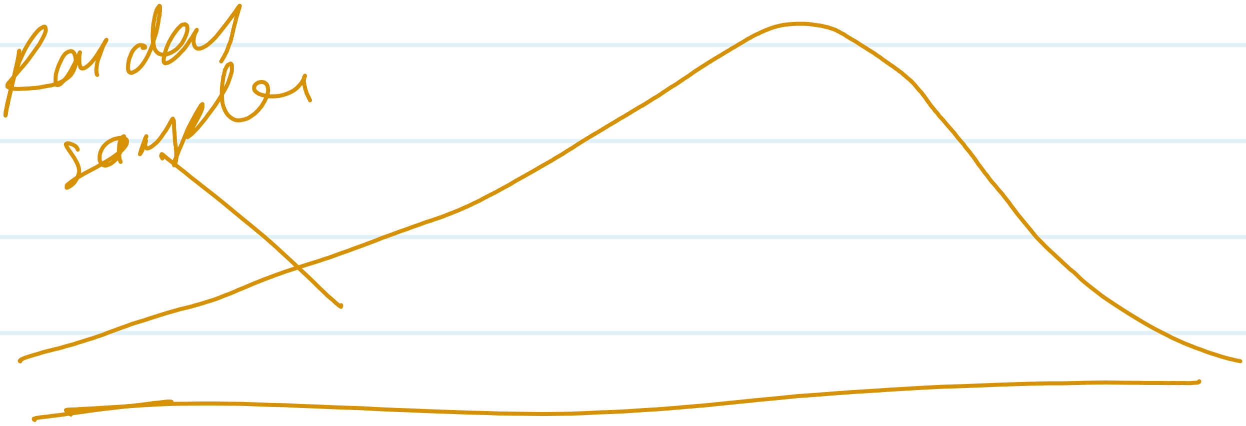
1. $n_1 = 30$ — $\bar{x}_1 - 22$
2. $n_2 = 35$ — $\bar{x}_2 - 11$
3. $n_3 = 40$ — $\bar{x}_3 - 8$
4. $n_{40} = 80$ — $\bar{x}_4 - 6$

Data $[\bar{x}_1\ \bar{x}_2\ \bar{x}_3 \text{ ------ } \bar{x}_{40}]$





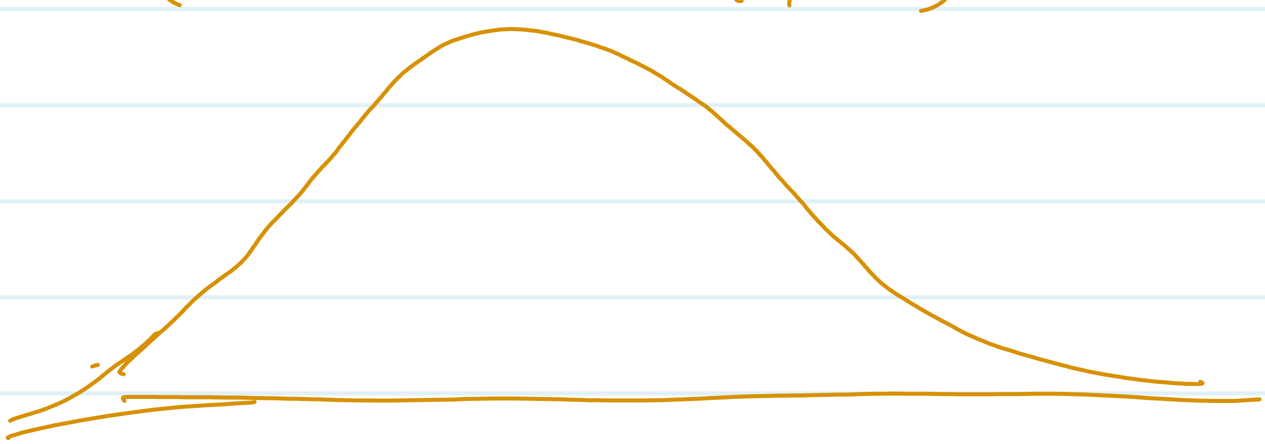
Random sample



$n \geq 30$

sample = 100

$(\bar{X}_1, \bar{X}_2 \; - - \; \bar{X}_{100})$



* Probability

1. Permutation
2. Combination

1. Permutation :-

Eg :- In a school trip 50 student facing 6 chocolate

⇒ [DM, KK, mund, perk, start, silk]

⇒ Pick = 3 chocolate

$$^nP_r = \frac{n!}{(n-r)!}$$

n = Total no. of chocol.

r = pick choco.

$$= \frac{6!}{(6-3)!}$$

$$= \frac{6!}{3!} \Rightarrow \frac{6\times5\times4\times\cancel{3!}}{\cancel{3!}}$$

$$\Rightarrow 120$$

② Combination

$$^{n}C_{r} = \frac{n!}{r!\,(n-r)!}$$

$$= \frac{6!}{3!\times3!}$$

$$= \frac{6\times5\times4\times\cancel{3!}}{3\times2\times1\times\cancel{3!}}$$

$$\Rightarrow \frac{120}{6} = \underset{C}{\boxed{20}}\times6 = \frac{120}{P}$$

A, B, C, D, E,

AB BC CD DE
AC BD CE
AD BE
AE

$$= \frac{5 \times \cancel{4}}{2 \times \cancel{3}} \Rightarrow \frac{20}{2} = 10 \times \cancel{2}$$

$$= 20$$

$$= \frac{5}{3} \Rightarrow \frac{5}{(5-2)!} \Rightarrow \frac{5 \times 4 \times \cancel{3}}{\cancel{3}} = \underline{\underline{20}}$$

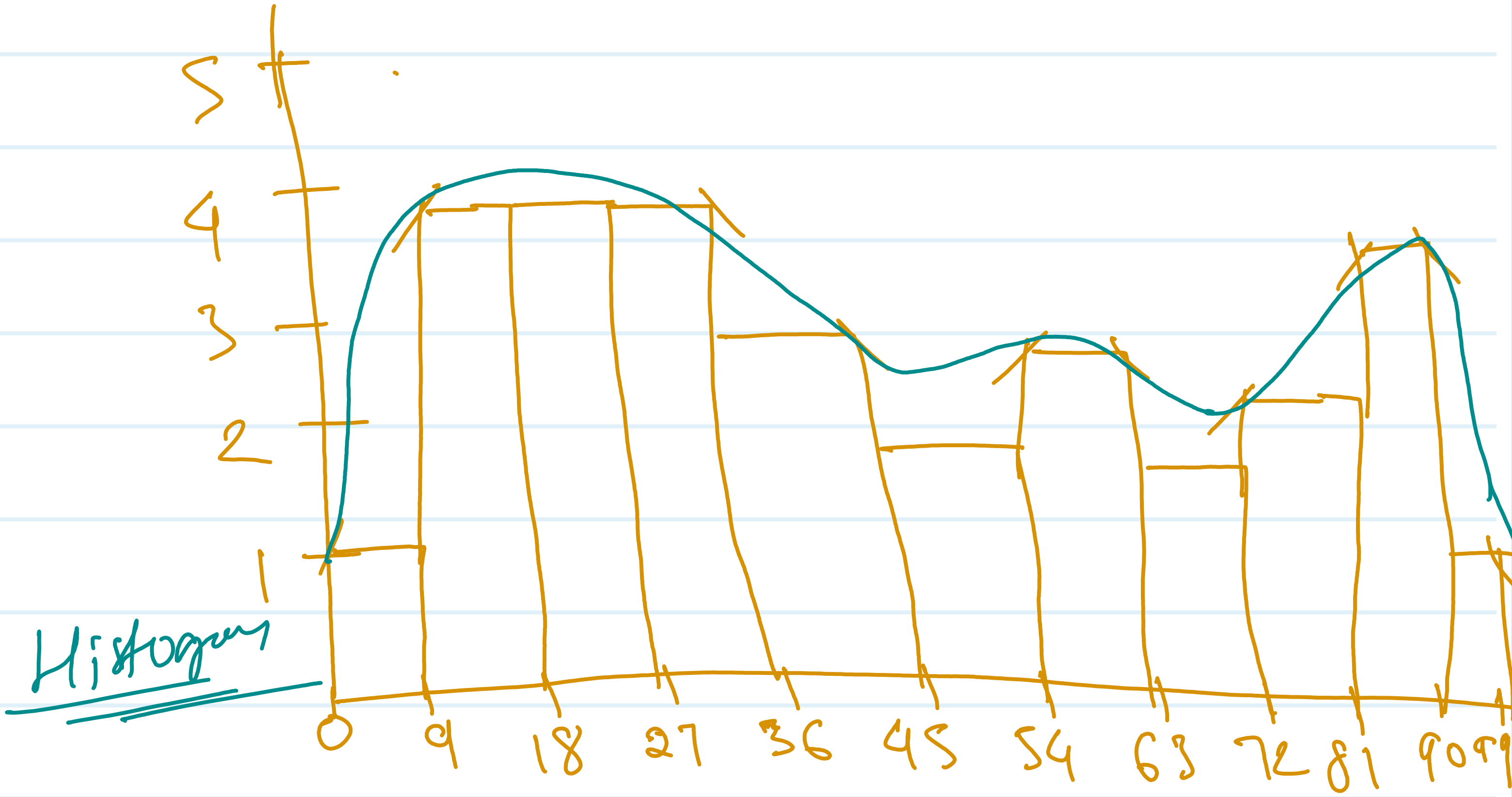
Histogram

[8, 10, 12, 13, 20, 22, 25, 26, 30,
32, 33, 35, 41, 44, 45, 47, 53,
56, 59, 61, 67, 71, 77, 83, 86,
90, 95, 100]

max = 100
min = 8
no. bin = 10

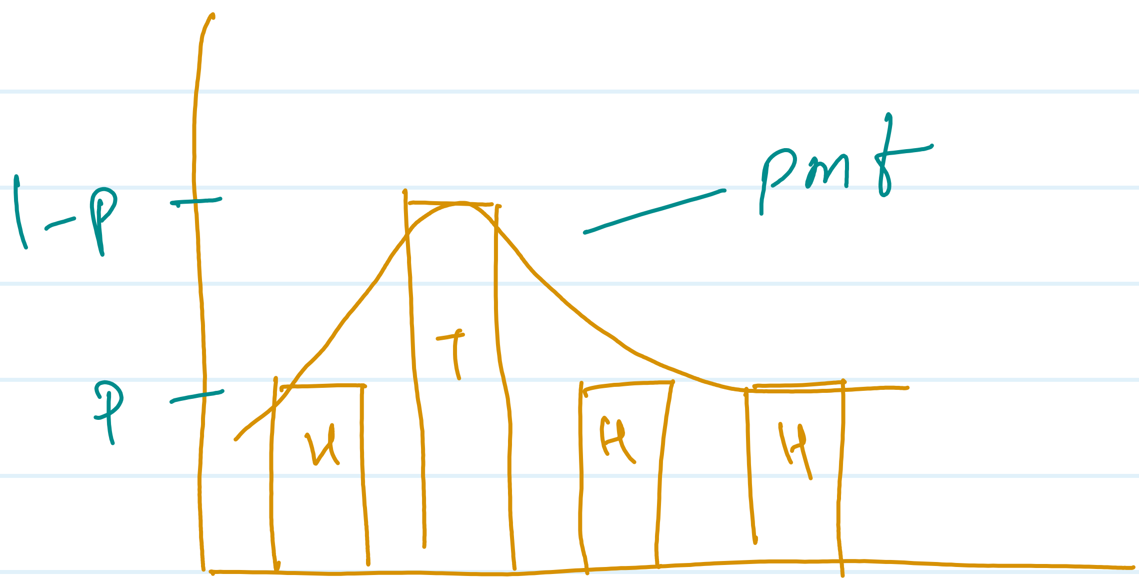
$$\text{bin size} = \frac{100-8}{9}$$

$\Rightarrow$ 9



Continous Histo.

pdf = Probability Dist. function
pmf = probability mass function.



Deseret Histo.