① Central Limit Theorem

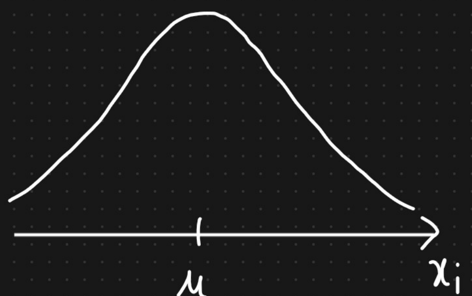
The central limit theorem relies on the concept of a sampling distribution, which is the probability distribution of a statistic for a large number of samples taken from a population.

The central limit theorem says that the sampling distribution of the mean will always be normally distributed, as long as the sample size is large enough. Regardless of whether the population has a normal, Poisson, binomial, or any other distribution, the sampling distribution of the mean will be normal.

n = Sample size $\Rightarrow$ any value

① $X \approx N(\mu, \sigma)$

Population DATA



$S_1 = \{x_1, x_2, x_4 \dots x_n\} = \bar{x}_1$

$S_2 = \{x_2, x_3 \dots x_n\} = \bar{x}_2$

S_3 $\quad \bar{x}_3$

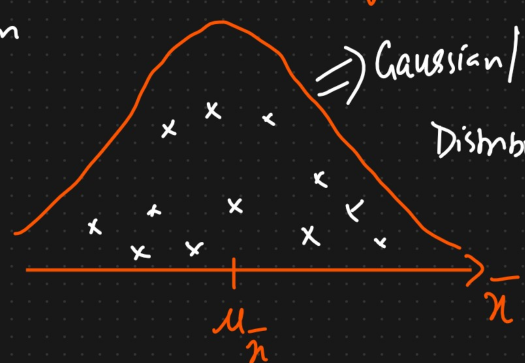
S_4

$\vdots$

S_m $\quad \bar{x}_m$

$\Downarrow$ $\boxed{CLT}$

Sampling distribution of the mean



$\Rightarrow$ Gaussian/Normal Distribution

② $X \not\approx N(\mu, \sigma)$

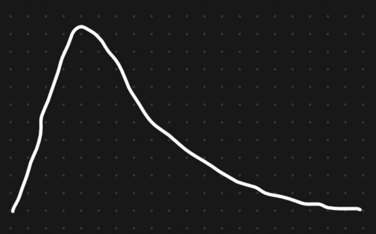
$\Rightarrow$ $\boxed{n \geq 30}$ $\Rightarrow$ sample size

S_1 $\quad \bar{x}_1$

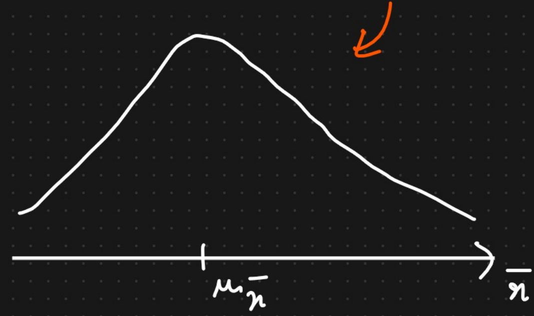
S_2 $\quad \bar{x}_2$

$\vdots$

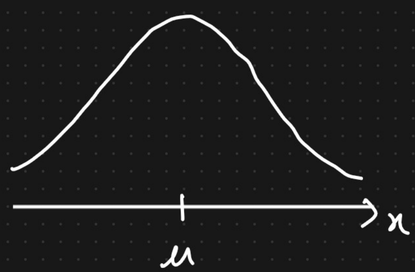
$\bar{x}_m$



$\Downarrow$ $\boxed{CLT}$



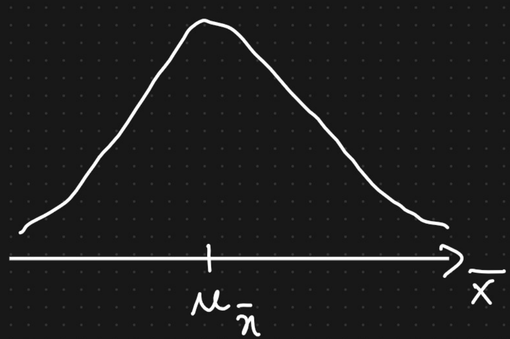
① Normal Distribution



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

$\Downarrow$

Sampling Distribution of mean



σ = population std

μ = population mean

n: sample size

$$X \sim N\left(\mu, \frac{\sigma}{\sqrt{n}}\right)$$