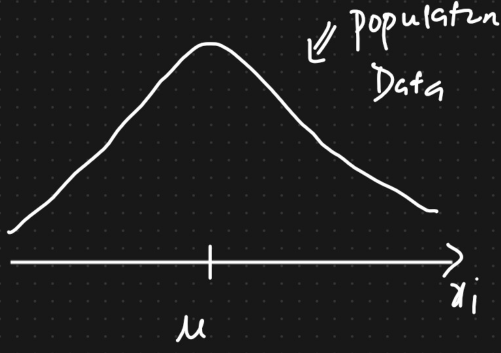
Central Limit Theorem (CLT)

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.

$n = 20$

① $X \approx N(\mu, \sigma)$



$S_1 = \{x_1, x_2, x_3 \cdots x_{20}\} = \bar{x}_1$

$S_2 = \{x_2, x_3, x_5 \cdots x_{20}\} = \bar{x}_2$

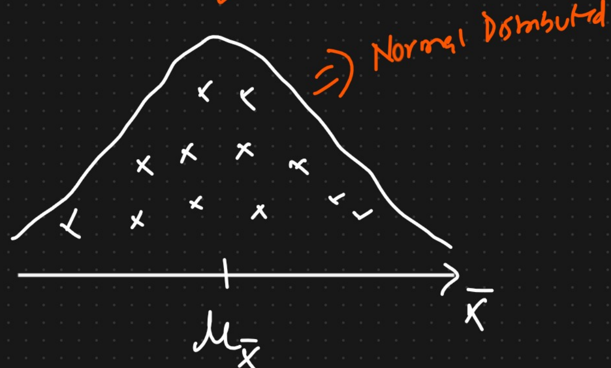
$S_3 = \{ \quad \} = \bar{x}_3$

$\vdots$

$S_m = \{ \cdots \} \quad \bar{x}_m$

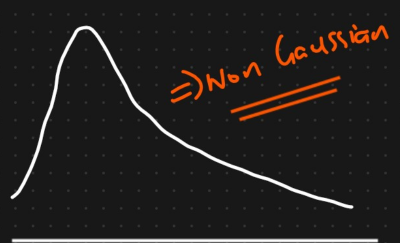
$\bar{X} = \{\bar{x}_1, \bar{x}_2, \bar{x}_3 \cdots \bar{x}_m\}$

$\Downarrow$



→ $\boxed{n \geq 30}$ ←

② $X \not\approx N(\mu, \sigma)$



$\Rightarrow$

$S_1 = \{x_1, x_2 \cdots x_{30}\} = \bar{X}_1$

$S_2 = \{x_2\ x_3 \cdots x_{30}\} = \bar{X}_2$

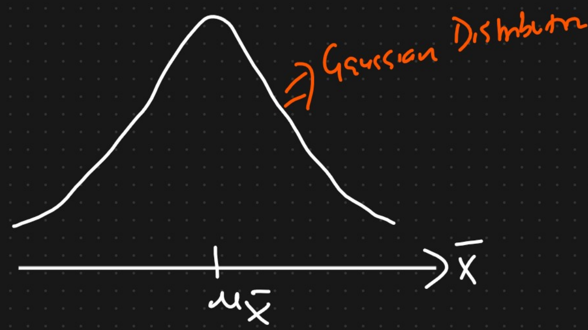
$S_3 = \quad \vdots \quad = \bar{X}_3$

S_4

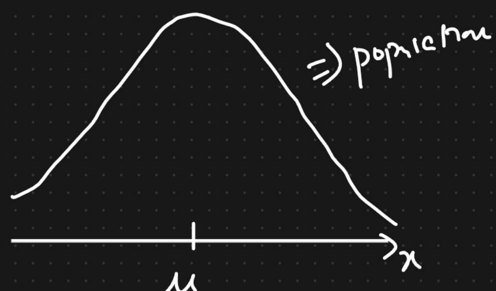
$\vdots$

S_m : $\bar{X}_m$

$\Downarrow$



Important for Interview



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

σ = population std

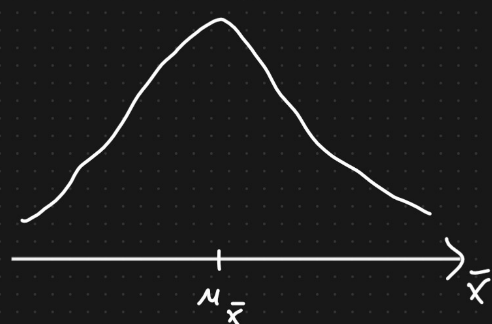
μ = population mean

n = sample size

$\Downarrow$

Sampling distribution of mean

CLT



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

n can be any value