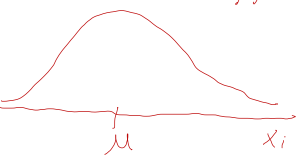
1) Central Limit Theorem

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 the whether the population has a normal, Poisson, binomial, or any other distribution, or any other distribution, the sampling distribution of the mean will be normal.

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

population Data



n = sample size $\Rightarrow$ any value

$S1 = \{x_1, x_2, \dots x_n\} = \bar{x}_1$

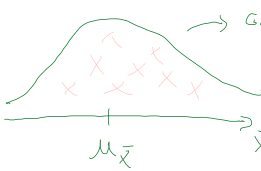
$S2 = \{x_2, x_3, \dots x_n\} = \bar{x}_2$

$S3 \qquad \bar{x}_3$

$\vdots$

$S_m \qquad \bar{x}_m$

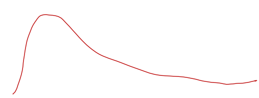
Sampling distribution of the mean $\Downarrow$



$\rightarrow$ Gaussian / Normal Distribution

2) $X \not\approx N(\mu, \sigma)$

$n \geq 30 \Rightarrow$ Sample size



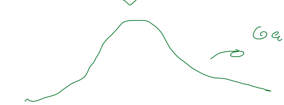
$S_1 \qquad \bar{x}_1$

$S_2 \qquad \bar{x}_2$

$\vdots$

$\bar{x}_m$

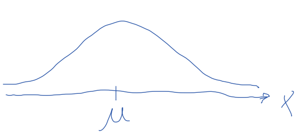
Central limit Theorem $\Downarrow$



$\rightarrow$ Gaussian / Normal Distribution

1) Normal distribution

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



n = sample size
σ = population std
μ = population mean

Sampling Distribution of mean

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