



STANDARD NORMAL **DISTRIBUTION**

INFERENCE STATISTICS

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TOPIC OUTLINE

Standard Normal Distribution

Central Limit Theorem



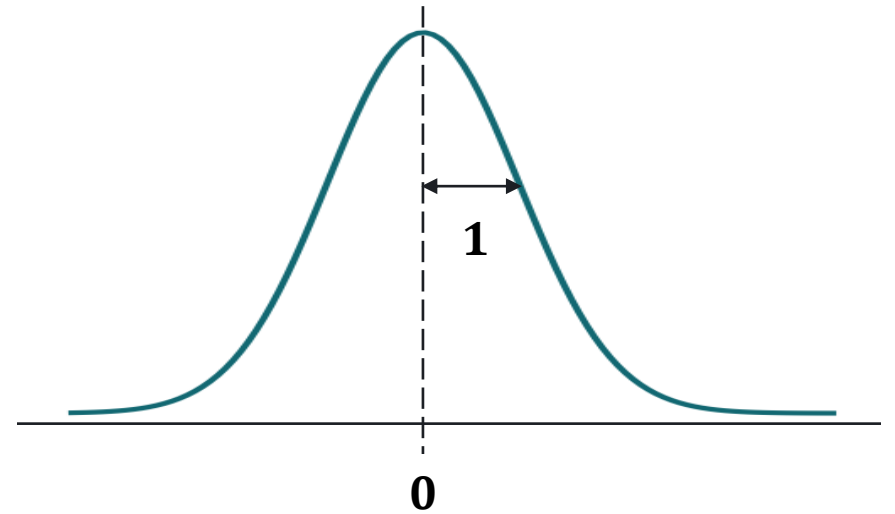
STANDARD NORMAL DISTRIBUTION



STANDARDIZATION

Standardization is the process of converting the distribution of a variable with (μ, σ^2) to a normal distribution $N(0, 1)$.

Normal Distribution:



STANDARD NORMAL DISTRIBUTION

Standard Normal Distribution:

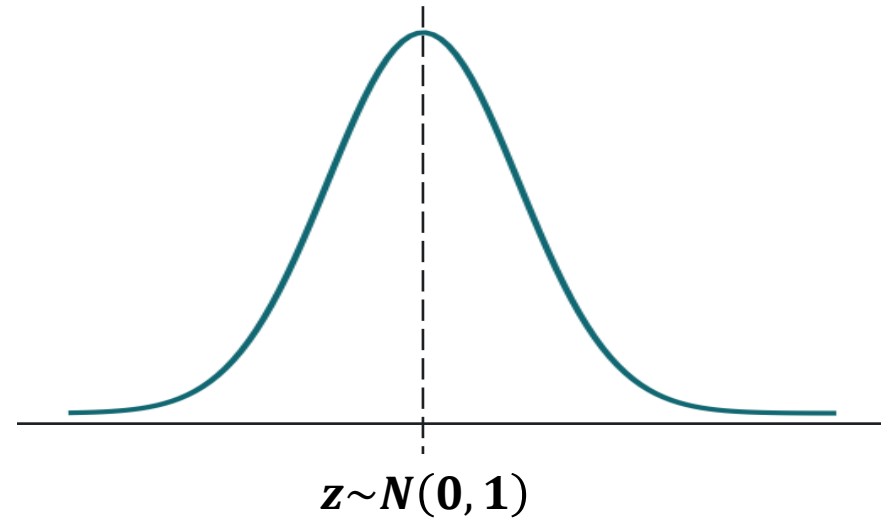
When we standardize the normal distribution $N(\mu, \sigma^2)$, the result is a standard normal distribution $z \sim N(0, 1)$.

Formula:

$$z = \frac{x - u}{\sigma}$$

where:

z is the z-score



EXERCISE

Convert the given dataset into a standard normal distribution $N(0, 1)$ by computing the **z-score** for each data point.

Dataset

1
2
2
3
3
3
4
4
5

Solution:

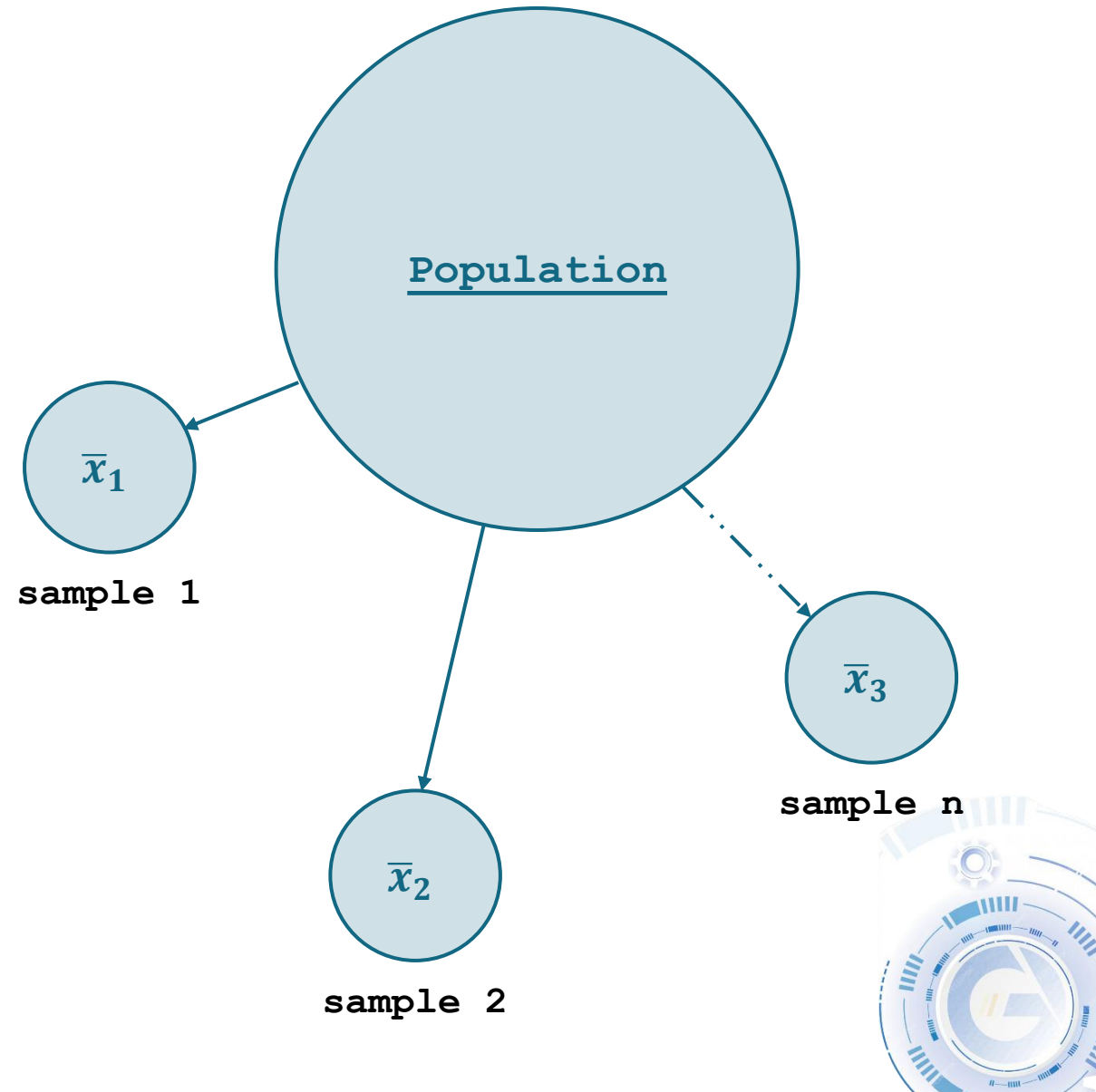


CENTRAL LIMIT THEOREM



CENTRAL LIMIT THEOREM

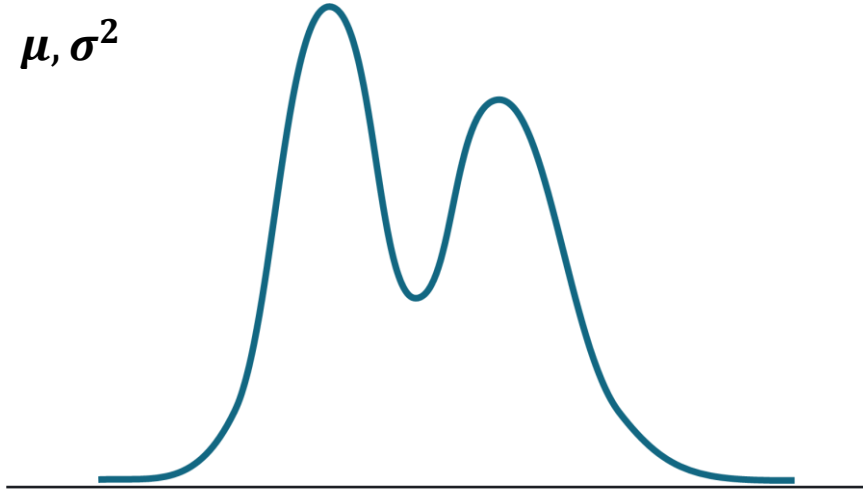
The Central Limit Theorem (CLT) states that the sampling distribution of the sample mean will be normally distributed, regardless of the shape of the original population distribution.



CENTRAL LIMIT THEOREM

Original Population Distribution:

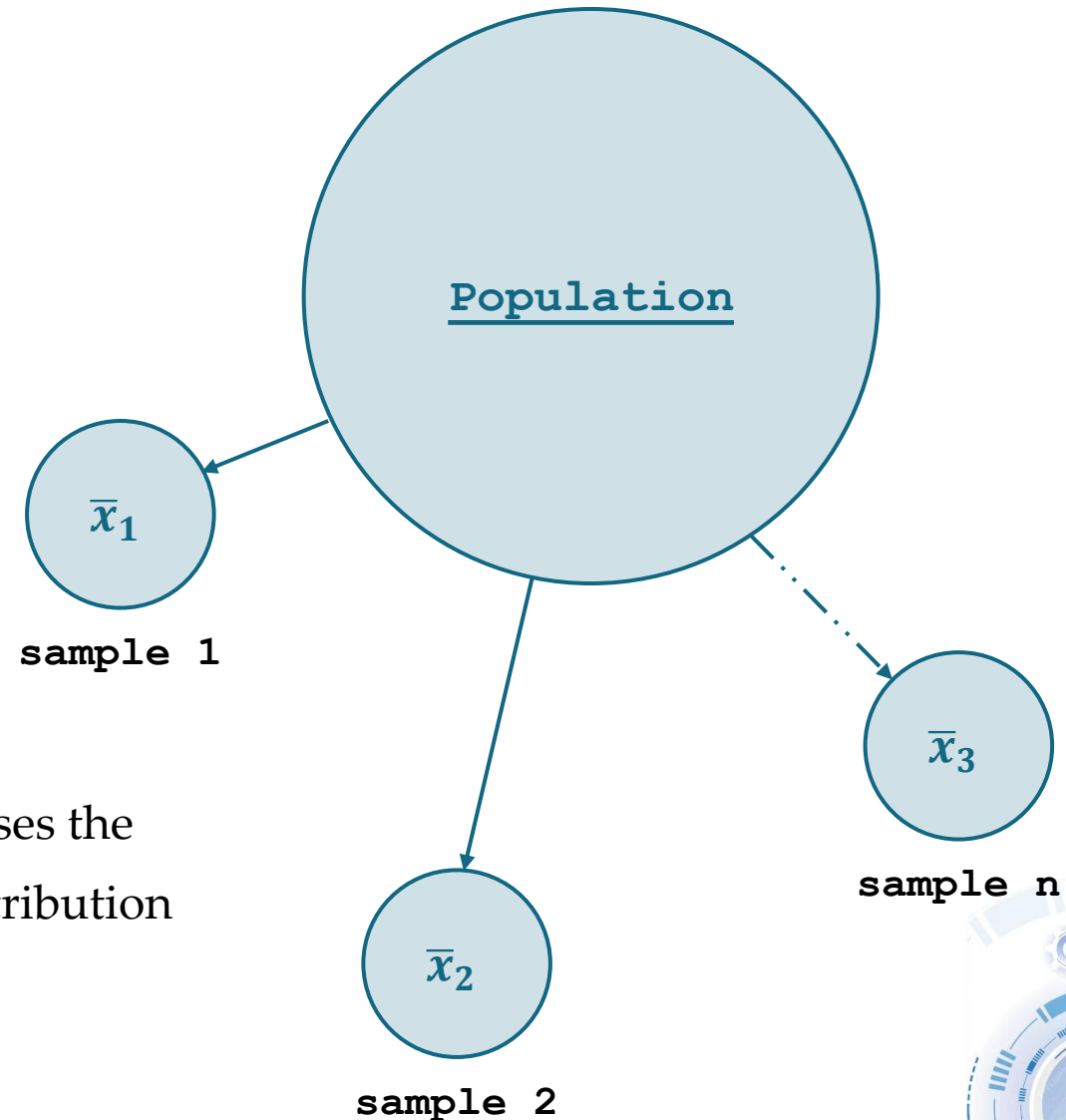
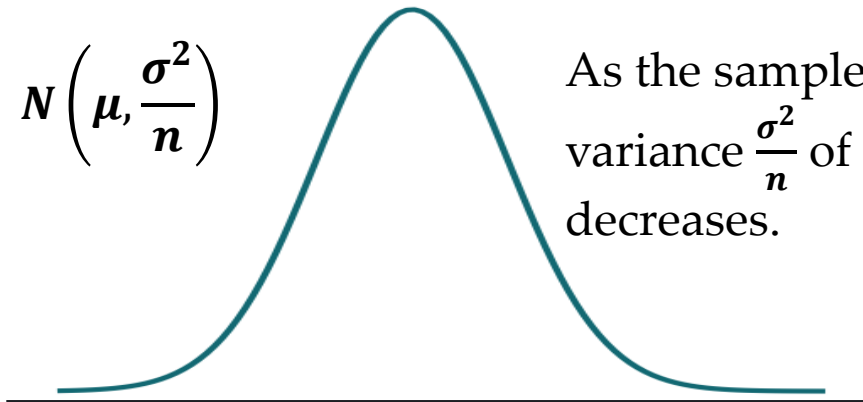
μ, σ^2



Sampling Distribution:

$N\left(\mu, \frac{\sigma^2}{n}\right)$

As the sample size n increases the variance $\frac{\sigma^2}{n}$ of sampling distribution decreases.



SAMPLING DISTRIBUTION

A sampling distribution is the probability distribution of a statistic (e.g., μ , σ^2) obtained from a large number of samples drawn from a specific population.

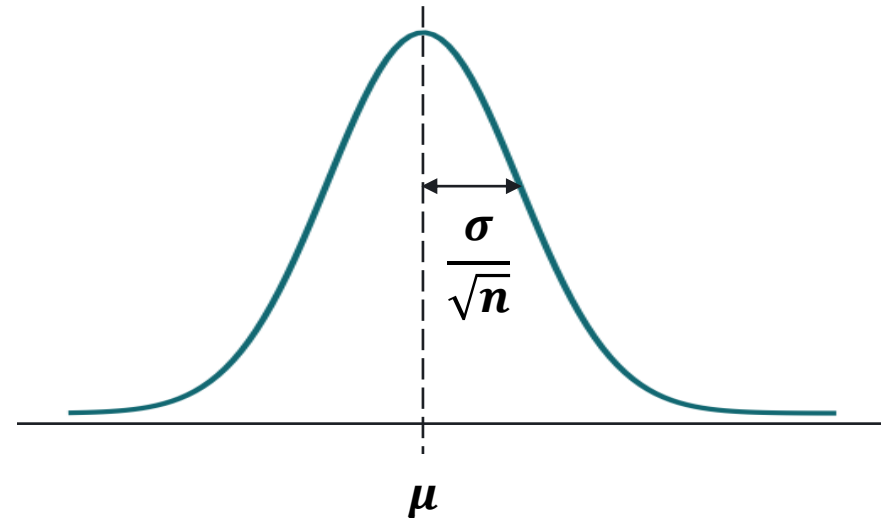
Denoted by:

$$N\left(\mu, \frac{\sigma^2}{n}\right), n > 30$$

where:

$\frac{\sigma^2}{n}$ is the variance of the sampling distribution

Sampling Distribution:



STANDARD ERROR

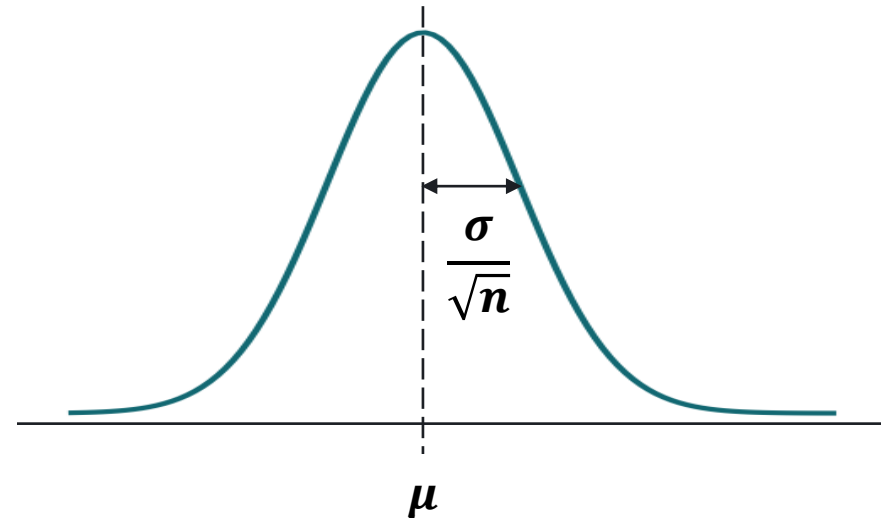
Standard error is the standard deviation of the distribution formed by the sample means:

$$N\left(\mu, \frac{\sigma^2}{n}\right)$$

Formula:

$$SE = \frac{\sigma}{\sqrt{n}}$$

Sampling Distribution:



LABORATORY

