Law of Large Numbers (LLN)

Let $X_1, X_2, X_3 \ldots$ be i.i.d. with mean μ. The **sample mean** is

$$\bar{X}_n = \frac{X_1 + X_2 + X_3 + \cdots + X_n}{n}$$

The **Law of Large Numbers** states that as $n \to \infty$, $\bar{X}_n \to \mu$ with probability 1. For example, in flips of a coin with probability p of Heads, let X_j be the indicator of the jth flip being Heads. Then LLN says the proportion of Heads converges to p (with probability 1).

Q20. What Is the Law of Large Numbers?

It is a theorem that describes the result of performing the same experiment a large number of times. This theorem forms the basis of **frequency-style** thinking. It says that the sample means, the sample variance and the sample standard deviation converge to what they are trying to estimate.

Q: What is the law of large numbers?

The Law of Large Numbers is a theory that states that as the number of trials increases, the average of the result will become closer to the expected value.

Eg. flipping heads from fair coin 100,000 times should be closer to 0.5 than 100 times.

Q: What is the Central Limit Theorem? Explain it. Why is it important?

The central limit theorem states that the sampling distribution of the sample mean approaches a normal distribution as the sample size gets larger no matter what the shape of the population distribution.

The central limit theorem is important because it is used in hypothesis testing and also to calculate confidence intervals.