

$$\star (\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots)$$

$$= 0 + \frac{t^2}{2} + \frac{1}{\sqrt{n}} \left[\frac{t^3}{3} + \frac{t^4}{(\sqrt{n})^4} + \dots \right]$$

↑ this is a
convergent series

Recall if n is large, then $\bar{X} \approx N(\mu, \sigma^2/\sqrt{n})$

Q So what if $n \rightarrow \infty$?

In some sense, \bar{X} "converges" to the single point μ .

LLN Laws of Large Numbers

1. Modes of convergence

1) Convergence in distribution

$$\lim_{n \rightarrow \infty} F_n(x) = F(x) \text{ for all points of continuity } x \text{ for } F(x).$$

2) Convergence in probability

For any $\epsilon > 0$

$$\lim_{n \rightarrow \infty} P[|\bar{Y}_n - \mu| < \epsilon] = 1$$