(4)

الفصل الثاني

- SAMPLING Distribution.

- let $X_1, X_2, \dots, X_n$ be a r.s of size n from a population and let $T(x_1, x_2, \dots, x_n)$ be a real (or vector-valued) function whose domain includes The sample space of $(X_1, X_2, \dots, X_n)$.
Then The random vector $Y = T(X_1, X_2, \dots, X_n)$ is Called a statistic

- The probability distribution of a statistic Y is Called The sampling distribution of Y.

متوسط الحسابي

- The Sample mean is The arithmetic average of The Values in a r.s

تمثل الوسط الحسابي للعينة

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n} = \frac{1}{n} \sum_{i=1}^{n} X_i$$

- The Sample Variance is The statistic defined by

standard deviation بالنسبة للعينة

$$S^2 = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \bar{X})^2$$

الانحراف المعياري

- The Sample standard deviation is The statistic defined by S.

- SAMpling from Normal distribution.

properties of The Sample mean and Sample Variance

let $X_1, X_2, \dots, X_n$ be a r.s of size n from $N(\mu, \sigma^2)$ distribution Then..

(a) $\bar{X}$ and $\bar{S}$ are independent rvs.

(b) $\bar{X} \sim N(\mu, \sigma^2/n)$

(c) $\frac{(n-1)S^2}{\sigma^2} \sim \chi^2_{n-1}$

- let $X_1, X_2, \dots, X_n$ be a r.s of size n from $N(\mu, \sigma^2)$ distribution Then

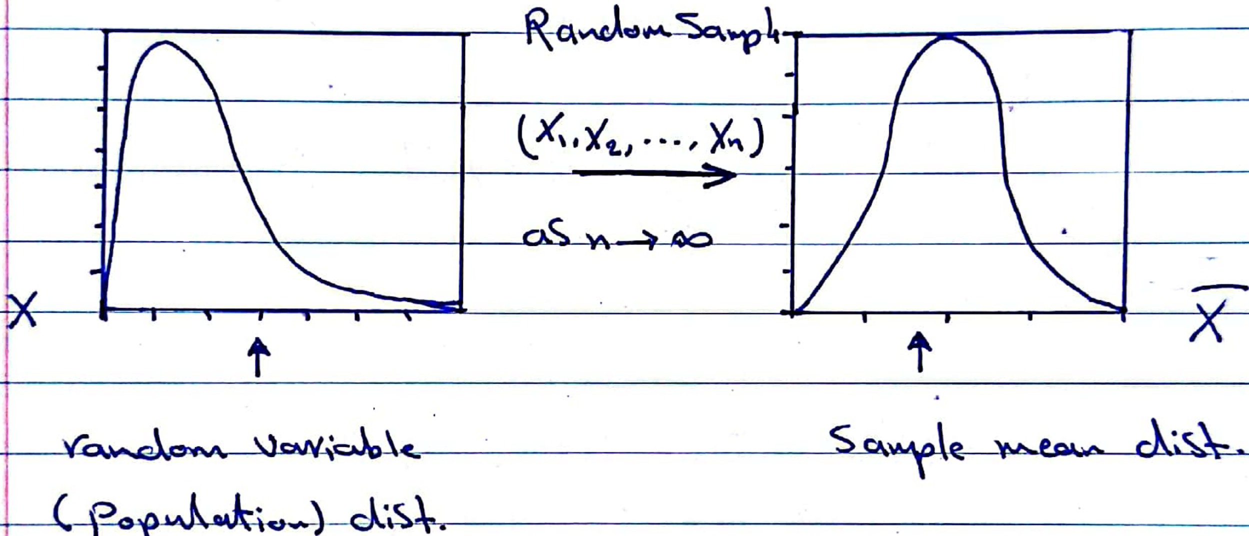
$$\frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1)$$

most of The time σ is unknown So we use

$$\frac{\bar{X}-\mu}{S/\sqrt{n}}$$

Central Limit Theorem

if a random Sample is drawn from any Population The Sampling distribution of The Sample mean is approximately normal for a sufficiently large Sample Size. The large The Sample Size The more closely The Sampling distribution of $\bar{X}$ will resemble a normal distribution.



- Sampling distribution of The Sample mean.

الوسط الحسابي للـ Population   تباين متوسط العينات

الوسط الحسابي للمتوسطات $\rightarrow \mu_{\bar{x}} = \mu$ $\sigma^2_{\bar{x}} = \frac{\sigma^2}{n}$ or $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

if X is normal, $\bar{X}$ is normal   تقريبا

if X is non-normal, $\bar{X}$ is approximately normal distributed for Sample Size greater Than or equal to 30