* ملخص الفصل الرابع *

1- CI for μ when σ^2 is known

$$\to P\left(\bar{x} - Z_\alpha\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{x} + Z_\alpha\left(\frac{\sigma}{\sqrt{n}}\right)\right) = 1-\alpha$$

2- CI for μ when σ^2 is unknown.

$$\to P\left(\bar{x} - t_{n-1}\left(\frac{s}{\sqrt{n}}\right) < \mu < \bar{x} + t_{n-1}\left(\frac{s}{\sqrt{n}}\right)\right) = 1-\alpha$$

3- CI for difference in Two means $(\mu_1 - \mu_2)$ when σ_1^2 and σ_2^2 are known.

$$\to (\bar{x}_1 - \bar{x}_2) - Z_\alpha\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + Z_\alpha\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

4- CI for the difference in Two means $(\mu_1 - \mu_2)$ when σ_1^2 and σ_2^2 are unknown.

$$\to (\bar{x}_1 - \bar{x}_2) - t\sqrt{S_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + t\sqrt{S_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

5- CI for Population variance (σ^2)

$$\to P\left[\frac{(n-1)S^2}{\chi^2\left(\frac{\alpha}{2}, n-1\right)} \le \sigma^2 \le \frac{(n-1)S^2}{\chi^2\left(1-\frac{\alpha}{2}, n-1\right)}\right] = 1-\alpha$$

6- CI for the binomial Proportion Parameter p

$$\to P - Z\sqrt{\frac{P(1-P)}{n}} < P < P + Z\sqrt{\frac{P(1-P)}{n}}$$

Chapter Four
Interval Estimation Theory

Basic concepts:

in the interval Estimation we will get two values (U, L) which contain the True value of the Parameter θ with Some confidence Probability $(1-\alpha)$ where

α: هو احتمال ان الفترة لا تضم المعلمة

فان

$$P(L < \theta < U) = 1 - \alpha$$

L and U are two r.v.s depending on the estimator $\hat{\theta}$ for the Parameter θ.

حيث

(U, L) : تمثل فترة الثقة

$(U-L)$ قياس لدقة التقدير

$(1-\alpha)$ قياس الثقة او مستوى الثقة

The confidence level of an interval estimate of a parameter is the probability that the interval estimate will contain the Parameter

* Chapter Four *
* Interval Estimation Theory *

Confidence Intervals for population Mean (μ)

The Point estimator for population mean μ is $\bar{X}$ as best estimator, which do not expected to be equal to the Parameter μ.

$\bar{X}$ can be Used to Form the CI for μ depending on the sampling dist. of $\bar{X}$

1 — Building a Confidence Interval For μ when σ^2 is known.

We know that $\dfrac{\bar{X}-\mu}{\sigma/\sqrt{n}}$ is distributed as a standard normal (Z), So we have a 95% Confidence interval for the Population Mean μ.

$$P\left(\bar{X}-1.96\left(\frac{\sigma}{\sqrt{n}}\right)<\mu<\bar{X}+1.96\left(\frac{\sigma}{\sqrt{n}}\right)\right)=1-\alpha$$

In general For Z_α the $(1-\alpha)\%$ CI of μ will be as:

$$P\left(\bar{X}-Z_\alpha\left(\frac{\sigma}{\sqrt{n}}\right)<\mu<\bar{X}+Z_\alpha\left(\frac{\sigma}{\sqrt{n}}\right)\right)=1-\alpha$$