اللهم اجعل عملي كله
صالحاً واجعله لوجهك
خالصاً

Second full summary :-

⇒ Dis of sample mean :-

Is the pop Normal ?
- yes → $\bar{x} \sim N(\mu, \frac{\sigma^2}{n})$ regardless of n.
- NO. → take $n \geq 30$ ⇒ $\bar{x} \sim N(\mu, \frac{\sigma^2}{n})$ CLT

Is σ (pop std) given ?
- yes ⇒ $z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$
- NO ⇒ $t = \frac{\bar{x} - \mu}{s / \sqrt{n}}$

⇒ Dis of sample proportion :-

$\hat{p} \sim N(p, \frac{p(1-p)}{n})$ ⇒ $z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$.

Population parameter	Point estimation	C.I for parameter	Test statistics
μ	$\bar{X}$	**1) σ known** $\bar{X} \mp Z_{\frac{\alpha}{2}} * \frac{\sigma}{\sqrt{n}}$ **2) σ unknown:** $\bar{X} \mp t_{\frac{\alpha}{2}} * \frac{S}{\sqrt{n}}$	$Z = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$ $t = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$
μ1 − μ2 (Independent)	$\bar{X} - \bar{Y}$	$(\bar{X} - \bar{Y}) \mp t_{\alpha/2} * S.P * \sqrt{\frac{1}{n} + \frac{1}{m}}$ The pooled variance: $S^2 = \frac{S_1^2(n-1) + S_2^2(m-1)}{n+m-2}$ $df = n + m - 2$	$t = \frac{\bar{X} - \bar{Y}}{S.P\sqrt{\frac{1}{n} + \frac{1}{m}}}$
μ1 − μ2 = μd	$\bar{d}$	$\bar{d} \mp t_{\alpha/2} * \frac{s.d}{\sqrt{n}}$ $\bar{d} = \frac{\sum d_i}{n}$ $S.d = \sqrt{\frac{\sum d_i^2}{n-1} - \frac{(\sum d_i)^2}{n*(n-1)}}$	$t = \frac{\bar{d} - \mu_d}{s.d/\sqrt{n}}$
P	$\hat{P}$	$\hat{P} \mp Z_{\frac{\alpha}{2}} * \sqrt{\frac{\hat{P}(1-\hat{P})}{n}}$	$Z = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}}$

Determination of Sample size:-

for $\mu \Rightarrow n = \left(Z_{\alpha/2} \cdot \frac{\sigma}{E} \right)^2$.

for $P \Rightarrow n = \left(\frac{Z_{\alpha/2}}{E} \right)^2 \cdot \hat{p}(1-\hat{p})$

$\hat{p}$
- → given ✓
- → not given ⇒ assume $\hat{p} = 0.5$

- **Types of errors:**

⚠ هي الأخطاء التي يحتمل الوقوع بها اثناء اختبار الفرضيات.

	H_0 true \ H_1 false	**H_0 false \ H_1 true**
Reject H_0	Type (1) error α : significance level	$1 - \beta$ Power of the test
Accept H_0	–	Type (2) error β