Estimation

chapter 6

① $\mu \rightarrow \bar{x}$

ask about $\bar{x}$ (sample mean)

* $\bar{x} \sim (\mu, \frac{\sigma^2}{n})$
* $z = \frac{(\bar{x} - \mu)\sqrt{n}}{\sigma}$ (central limit theorem)

ask about μ (population mean)

$\mu \Rightarrow \bar{x} \pm E$

σ known: $E = z_{\frac{\alpha}{2}} * \frac{\sigma}{\sqrt{n}}$

σ unknown:
- $n > 200$: $E = z_{\frac{\alpha}{2}} * \frac{s}{\sqrt{n}}$
- $n < 200$: $E = t_{\frac{\alpha}{2}} * \frac{s}{\sqrt{n}}$

② $p \rightarrow \hat{p}$

ask about $\hat{p}$ ← (the probability that the sample proportion)

$\hat{p} \sim n(p, \frac{pq}{n})$

$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$

ask about p ← (proportion of ----)

$p \Rightarrow \hat{p} \pm E$

$\hat{p} = \frac{x}{n}$

$E = z_{\frac{\alpha}{2}} * \sqrt{\frac{\hat{p}\hat{q}}{n}}$

$\hat{p} + \hat{q} = 1$

* standard error (standard deviation) $= \frac{\sigma}{\sqrt{n}}$
* confidence interval $= (1 - \alpha)$
* $\sigma = \frac{\sqrt{\Sigma(x - \bar{x})^2}}{n - 1}$
* $\bar{x} = \frac{\Sigma x}{n}$
* degree of freedom (df) $= n - 1$
* $T = \frac{(\bar{x} - \mu)\sqrt{n}}{s} \sim t(n-1)$ (df)

chapter 7

Test of hypothesis (for one sample)

H_0 vs H_1

test statistic

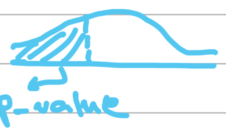
p-value

p-value > α accept Ho

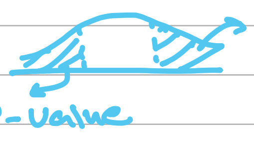
p-value ≤ α reject Ho

more than > →

Less than < →

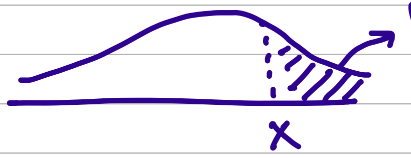


different ≠ →

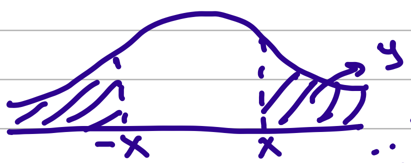


* خطوات الحل :-

← تعطى قيمة x بالسؤال أو يتم حسابها



← تحسب قيمة p-value باستخدام الجداول



→ ملاحظة في هذا المنحنى

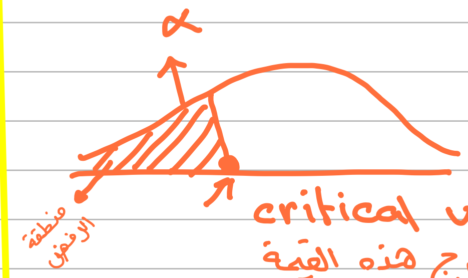
P-value = 2y

← تعطى قيمة α بالسؤال

P-value > α ✓ Ho

P-value ≤ α ✗ Ho

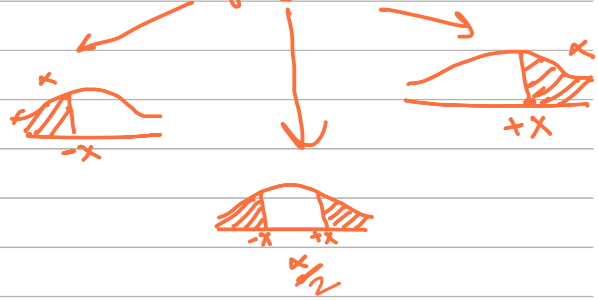
Rejection Region



critical value

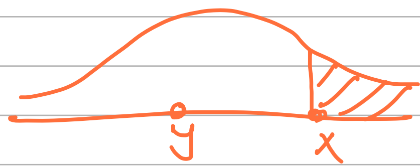
لم تستخرج هذه القيمة بالإعتماد على المساحة تحت المنحنى α وإستخدام الجداول.

حالاتها



تـاج الـذكـر

لَا إِلَهَ إِلَّا اللَّهُ، وَحْدَهُ لَا شَرِيكَ لَهُ، لَهُ المُلْكُ وَلَهُ الحَمْدُ، وَهُوَ عَلَى كُلِّ شَيْءٍ قَدِيرٌ



إذا y كانت خارج منطقة الرفض Ho ✓

إذا y كانت داخل منطقة الرفض Ho ✗

chapter 7

test statistic

① Test for mean

- σ known: $Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$
- σ unknown, $n < 30$: $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$
- σ unknown, $n \geq 30$: $Z = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$

Test for proportion

$H_0: P = P_0 \quad H_1: P \neq P_0$

$$Z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

p:- — 0.001 — highly significant — 0.01 — 0.05 — 0.1 — NS

- 0.001 ← very highly significant
- 0.01 ← significant

$$L = 2 * E$$

L ← length

$$n = \frac{4\left[Z_{\alpha/2} * \sigma\right]^2}{L^2}$$

chapter 8:- Test of hypothesis for (2 samples)

Dependent sample (before and after)

$$\bar{d} = \frac{\Sigma d}{n}$$

$$s_d^2 = \frac{\Sigma d^2}{n-1} - \frac{(\Sigma d)^2}{n(n-1)}$$

↳ (the mean difference)

$$\mu_d = \bar{d} \pm E$$

$$E = t_{\alpha/2} * \frac{s_d}{\sqrt{n}}$$

for test stat →

$$t = \frac{\bar{d}}{\frac{s}{\sqrt{n}}}$$

Independent sample

$(\mu_1 - \mu_2) = (\bar{x}_1 - \bar{x}_2) \pm E$

↳ mean difference ... between.

E

- σ_1, σ_2 unknown, $\sigma_1 = \sigma_2$: $E = t_{\alpha/2} * s_p \sqrt{\frac{1}{n} + \frac{1}{m}}$ → SE
- σ_1, σ_2 known: $E = z_{\alpha/2} * \sqrt{\frac{\sigma_1^2}{n} + \frac{\sigma_2^2}{m}}$

s_p :- pooled standard deviation

s^2 = pooled variance

$$s^2 = \frac{(n-1)s_1^2 + (m-1)s_2^2}{n+m-2}$$

↙ df (degree of freedom)

to make test

σ_1, σ_2 Known

$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n} + \frac{\sigma_2^2}{m}}}$$

σ_1, σ_2 unknow

$\sigma_1 = \sigma_2$

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{sp \sqrt{\frac{1}{n} + \frac{1}{m}}}$$

سُبحان اللّٰه

الحَمد للّٰه

لا إله إلا اللّٰه

اللّٰه أكبر

أستغفِرُ اللّٰه

لا حَول و لا قوة إلا باللّٰه

سُبحان اللّٰه و بِحمده

سُبحان اللّٰه العَظيم

♡♡