

$$b) \bar{y} \pm z_{1-\alpha/2} \sigma / \sqrt{n}$$

given $\sigma = 2$

$n = 25$ (sample size)

$$\alpha = 1 - 0.9 = 0.1$$

$$z_{1-\alpha/2} = z_{1-0.05} = z_{0.95} = 1.645$$

$$\bar{y} = \frac{\sum x_i}{n} = \frac{1232.5}{25} = 49.3$$

$$49.3 \pm 1.645 \frac{2}{\sqrt{25}} \rightarrow [48.642, 49.958]$$

$$49.3 \pm 0.658$$

c) Hyp. testing

$H_0: \mu_0 = 50$ v.s. $H_a: \mu_0 \neq 50$

Q: Test statistics

$$D = \frac{|\bar{y} - \mu_0|}{\sigma / \sqrt{n}}$$

under H_0

$$\sim N(0, 1) / G(0, 1)$$

under H_0

d) obs. value for D , denote by d .

$$\bar{y} = 49.3 \quad (\text{from b})$$

$$\mu_0 = 50$$

$$\sigma = 2, \quad \sqrt{n} = \sqrt{25} = 5$$

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stat 231 tut 4.

$$d = \frac{149.3 - 501}{\sqrt{25}} = 1.75$$

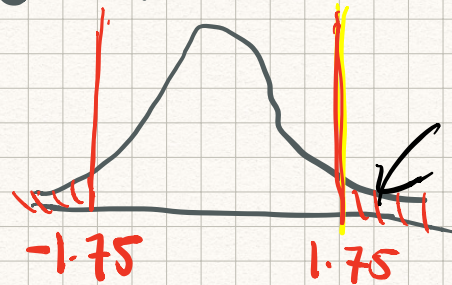
$$P(|D| > d) \text{ (under } H_0)$$

$$= P(|D| > 1.75) \text{ (} D \sim N(0,1) \text{ under } H_0)$$

$$= 2(1 - P(Z \leq 1.75))$$

$$= 2(1 - 0.95994)$$

$$= 0.08012 \text{ (p-value)}$$



e) weak evidence to against H_0

f) α - level of significance/
threshold value (on notes)

Want: compare α , p-value

$\alpha > \text{p-value}$
→ reject H_0

$\alpha < \text{p-value}$

→ not enough evidence
to against H_0

$$\alpha = 0.10, \text{ p-value} = 0.08$$

$\alpha > p\text{-value}$

reject H_0 ←

g) $CI = [48.642, 49.958]$

$\mu_0 = 50 \notin CI$

↳ data not support H_0

h) $\alpha = 0.10 \rightarrow \alpha = 0.05$

D - no change ($\sim Z(0.1)$ under H_0)

d - no change (1.75)

$p\text{-value} = 0.08 > \alpha = 0.05$

Conclusion: not reject H_0 .

i) By looking at it, "should" contain

$\mu_0 = 50$ in the new CI.

$$\bar{y} \pm Z_{1-\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$49.3 \pm Z_{0.975} \frac{2}{\sqrt{55}}$$

$$1.96 \pm \frac{0.740}{\sqrt{25}}$$

$$\rightarrow 49.3 \pm 1.96 \frac{0.740}{\sqrt{25}}$$

$$\rightarrow 49.3 \pm 0.784$$

$$[48.516, 50.084] = \text{NCI}$$

$$\mu_0 = 50 \in \text{NCI.}$$
