this inference time: for means

next time: & proportions

read: LN pp. L-137 → 173

STAT 7 12 Nov 19

getting to the finish line: ①

quiz 6 due tonight

quiz 7 due Tue night 19 Nov

homework 3 due Sun night 24 Nov R-60

quiz 8 due Tue night 26 Nov

quiz 9 due Tue night 3 Dec

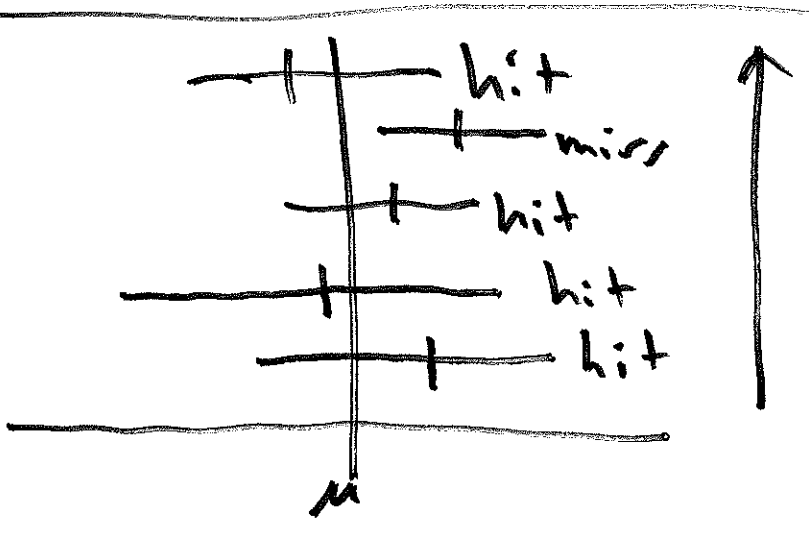
homework 4 due Sun night 8 Dec

take-home final due Sun night 15 Dec

L-145 → $\boxed{Q}$: is it true that $P_{F}(24.47°C < \mu < 25.58°C) = \cancel{95\%}$?

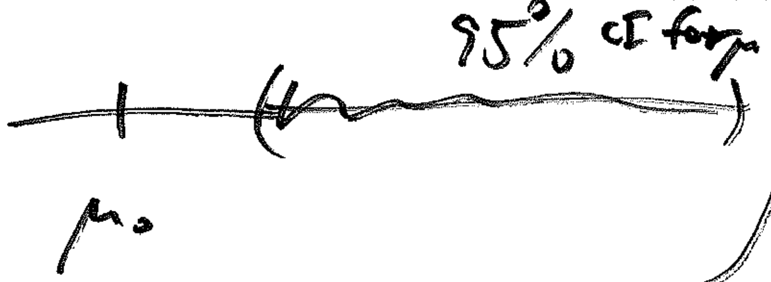
← undefined

$\boxed{A}$ No; μ is a fixed, unknown constant



hit = (includes μ)

about 95% of all possible 95% CIs will be hits fact: 95% conf. level not high enough for careful scientific work



you declare a statist. diff: this is a positive result; if you're wrong & μ_0 belongs in CI, you have just created a false positive; want false positive rate low; 95% conf. level $\leftrightarrow$ (100 − 95 = 5)% false positive rate

hallmark of good science: replicability of findings

better practice: ~~95%~~ | 5%/10 → 0.5% false + (99.5%)

related: 99.7% (part 3 of empirical rule) ③

99.9% CI | stat. sig. $\Big\}$ practical significance

$\boxed{1}$

$$\begin{pmatrix}\text{expected} \\ \text{value} \\ \text{of } \hat{p}\end{pmatrix} = \begin{pmatrix}EV \\ \text{of} \\ \hat{p}\end{pmatrix} = E_{IID}(\hat{p}) = p$$

$$= E_{IID}(\bar{y}) = \mu$$

$\boxed{2}$

$$\begin{pmatrix}\text{estimated standard} \\ \text{error} \\ \text{of } \hat{p}\end{pmatrix} = \begin{pmatrix}\hat{SE} \\ \text{of} \\ \hat{p}\end{pmatrix} = \hat{SE}_{IID}(\hat{p})$$

$$= \hat{SE}_{IID}(\bar{y}) = \frac{\hat{\sigma}}{\sqrt{n}} = \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}}$$

$$= \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{(0.83)(0.17)}{12}} \doteq 11\% = 0.11$$

math fact: if pop. has only 2 possible values in it,

$$\left(\begin{matrix}\text{pop.}\\ \text{SD}\end{matrix}\right) = \sigma = \left[\left(\begin{matrix}\text{larger}\\ \text{value}\end{matrix}\right) - \left(\begin{matrix}\text{smaller}\\ \text{value}\end{matrix}\right)\right] \sqrt{\left(\begin{matrix}\text{fraction}\\ \text{of}\\ \text{larger}\\ \text{value}\end{matrix}\right)\left(\begin{matrix}\text{fraction}\\ \text{of}\\ \text{smaller}\\ \text{value}\end{matrix}\right)}$$

$1 - 0$ $\quad$ p $\quad$ $(1-p)$

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math fact: with a 0/1 pop. with $100p\%$ 1s,

$$\sigma = \sqrt{p(1-p)}$$

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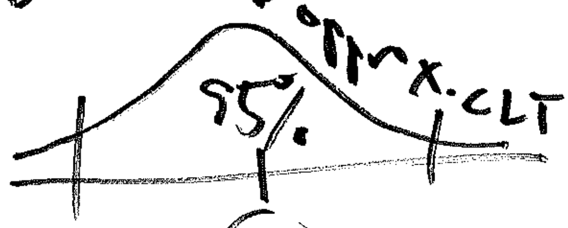
the diff. between 50% (p_0) & 83% ($\hat{p}$) is statistically significant (because p_0 is not in 95% CI for p) $\longleftrightarrow$ diff. is probably real



p

$-1.96 \quad 1.96$

long-run hist. of $\hat{p}$

approx. 95% CI for p in this class:

$$\hat{p} \pm 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$83\% \pm 2\,(11\%)$

approx 95% CI for p

50% p_0 | 61% | 83% | 105%

truncate at 100%

devil's advocate theory (DA) $(p = 50\%)$ p_0

DA's theory probably wrong