Interference for means 11/12/19

Read: LN pg L-137

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Getting to the Finish line:

- quiz 6 due tonight
- quiz 7 due tues night 19 NOV
- quiz 8 due Tues night 26 NOV
- quiz 9 due Tues night 3 Dec
- HW 3 due sun night 24 Nov R-60
- take home final due sun night 15 Dec
- HW 4 due sun night 8 Dec L-145

$$P_F(\bar{y} - 2.064\,\widehat{SE} < \mu < \bar{y} + 2.064\,\widehat{SE}) = 95\%$$

random, fixed, random

95% CI for μ

μ_0 24.3 (24.47°C, $\bar{y}$ 25.028, 25.58°C)

Theory: $\boxed{\mu = \mu_0 = 24.3°C}$ because μ_0 is not

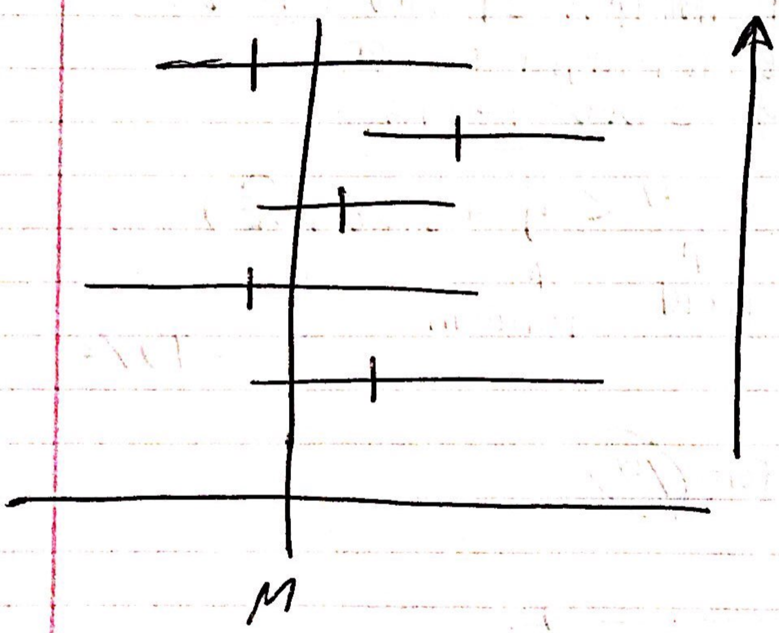
95% of data do not support theory

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

= undefined

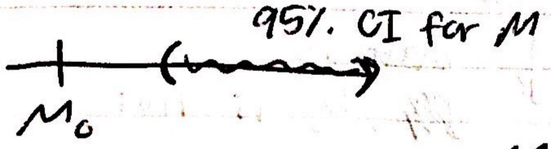
$\boxed{A}$ NO, μ is a fixed, unknown constant

hit = (includes μ)



about 95% of all possible 95% CIs will be hits

$\boxed{\text{FACT}}$ 95% conf. level not high enough for useful scientific work



you declare stats diff: this is a positive result; if you're wrong μ_0 belongs in CI, you created a false positive; want false positive rate low; 95% conf. level ⟷ (100 − 95 = 5)% false pos. rate hallmark of good science: replicability of findings

Better practice: ~~95%~~ | $5\%/10 \to 0.5\%$ false + 99.5%

Related: 99.7% (part 3 of empirical rule)

99.7% CI	stat sig	practical significance

$$\left(\text{expected value of } \hat{p}\right) = \left(\text{EV of } \hat{p}\right) = E_{IID}(\hat{p}) = p$$

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

$\boxed{2}$ $\left(\text{Estimated standard error of } \hat{p}\right) = \left(\widehat{SE} \text{ of } \hat{p}\right) = \widehat{SE}_{IID}(\hat{p})$

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

$$= \sqrt{\frac{(0.83)\cdot(.17)}{12}}$$

$$= 11\% = 0.11$$

$\boxed{\text{Math Fact}}$ if population has only 2 possible values in it,

$$\left(\text{population SD}\right) = \sigma = \left[\left(\text{larger value}\right) - \left(\text{smaller value}\right)\right] \sqrt{\left(\text{Fraction of larger value}\right)\left(\text{Fraction of smaller value}\right)}$$

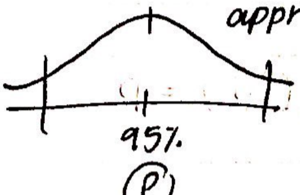
$$\quad\quad 1 \quad - \quad 0 \quad\quad\quad p \quad\quad (1-p)$$

$\boxed{\text{Math Fact}}$ with a 0/1 pop, with 100p% 1s,

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

the different between 50% (p_0 ≠ 83%)
($\hat{p}$ is statistically significant) because p_0 is not in 95% CI for p) ⟷ diff is ~~[illegible]~~ probably real

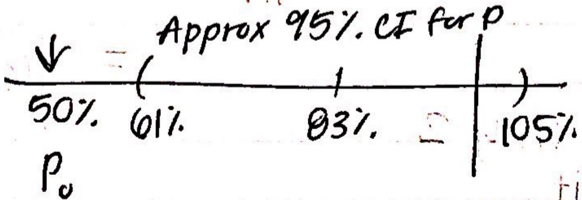
$\hat{SE}$ 11% normal approx CLT



long run hist of $\hat{p}$

approx. 95% CI for p in this class
$*\ \hat{p} \neq 1.96\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}\ *$

83% ≠ 2 (13%)



truncate at 100%

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

DA's theory probably wrong