N.N.

(1)

AMS 7 - Lecture 5.17.18

THIS TIME: 2-Sample Paired Comparison

NEXT TIME: 2 Independent Samples

▷ Read: LN Pg. L-186 → 213

Today: LN Pg. L-188 →

* HW #3 → Problem 2a → Pg. R-23 can help with this problem!

(L-188 ↓ L-190) Two cases to consider

1) Paired comparisons
2) Analysis of 2 independent samples

* RATS

→ The T & C means are interesting to decide Practical significance

$$\frac{\bar{y}_T - \bar{y}_C}{\bar{y}_C} = \frac{683-647}{647} = 0.056$$

{ T mean was 5.6% larger than the C mean (Practsig)

• 2-Sample Problem → 1-sample problem conversion

Take differences by T − C = D

↳ Can also get mean & SD of difference

* Blood Pressure (before & after drug)

→ measurement of before & after on same individual

* Deer Leg Length

→ Hind leg longer

Population	Sample	Img. data
All Relevant Deer for generalization	The observed Deer	all possible $\bar{d}$s (mean diff)

→ Give inferential summary

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Inferential summary

unknown population quantity of main interest	μ_d = pop. mean diff. in hind vs. foreleg length
Estimate	$\bar{d} = 3.30$ cm
Give or take for $\bar{d}$ as estimate of μ_d	$\hat{SE}(\bar{d}) = 0.97$cm
95% CI for μ_d	$\bar{d}_t \pm 2.262\ \hat{SE}(\bar{d}) = (1.11, 5.49)$

EV of $\bar{d} = E_{IID}(\bar{d}) = \mu_d = E_{IID}(\bar{y}) = \mu_d$

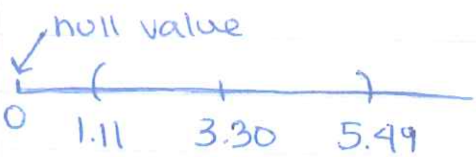
$\hat{SE}$ of $\bar{d} = \hat{SE}_{IID}(\bar{d}) = \hat{SE}_{IID}(\bar{y}) = \frac{\sigma_d\ s_d}{\sqrt{n}} = \frac{3.06\text{ cm}}{\sqrt{10}}$

$\bar{d} \pm \left(t_{n-1}^{95\%\,CI}\right)\frac{s}{\sqrt{n}}$

$= 0.97$cm

$3.30 \pm (2.262)(0.97)$

3.30 ± 2.19



* the difference is statsig b/c ∅ not in 95% CI

→ This example will help you with #4 on HW #3!

- Analysis of 2 independent samples

* Avg. age of reproduction in Daphnia
  quantitative & continous
  → How else can we tell there are indep. samples?
  sample sizes in the two columns are diff
  → make two models (one for each group I & II)
  L-195 & L-196

$\hat{SE}_{IID}(\bar{y}_1) = \frac{s_1}{\sqrt{n_1}}$ & $\hat{SE}_{IID}(\bar{y}_2) = \frac{s_2}{\sqrt{n_2}}$

$\hat{SE}_{IID\ indep.}(\bar{y}_2 - \bar{y}_1) = ?$

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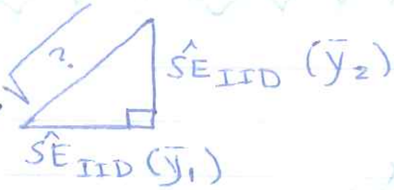
MATH FACT >>>



New Formula

$$\hat{SE}_{\substack{IID \\ indep}}(\bar{y}_2-\bar{y}_1) = \hat{SE}_{\substack{IID \\ indep}}(\bar{y}_1-\bar{y}_2) = \sqrt{\underbrace{\left(\hat{SE}_{IID}(\bar{y}_1)\right)^2}_{(0.2685)^2} + \underbrace{\left(\hat{SE}_{IID}(\bar{y}_2)\right)^2}_{(0.2419)^2}}$$

$$\hat{SE}_{\substack{IID \\ indep}}(\bar{y}_2-\bar{y}_1) = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Devil's adv → $\mu_2 - \mu_1 = 0$

↳ Not statsig nor pract sig b/c diff. too small & small sample size

L-201 * Redwood Trees & Sudden Oak Death

↳ By cluster sampling & Not IID

▷ Q#3 on HW #3 → Next lecture