*FINAL: MON. JUNE 6th 8-11 AM — 4 June 2005

(i) AB

FINAL EXAM REVIEW - review problems

(2) 2-independent samples w/ 1's and Ø's outcome (like C.S. 16) p.102 of reader

Treatment — 1 = rearrest, 0 = no

a) pop: [all relevant prisoners] rearrest?

N_1 = Big, [1's … Ø's], mean $= p_1 = ?$

≐ SRS, ≐ IID →

sample: [observed ex-convicts] rearrest?

[1's … Ø's], $n_1 = 592$

mean $= \hat{y} = \hat{p}_1 = 49.3\%$

hypothetical → [⋮] $n_1 = 592$, $\hat{p}_1 = ?$

imaginary data set: [possible $\hat{p}_1$'s]

[49.3% …] ↑ ∞ ↓

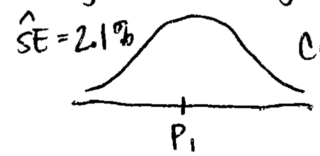
Long run mean? $= E(\hat{p}_1) = p_1$

est. long run SD? $= SE(\hat{p}_1)$

$$= \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}} = \sqrt{\frac{.493(.507)}{592}}$$

$= 2.1\%$

long run histogram? of $\hat{p}_1$



Control

pop: [ditto]

N_2 = Big, [1's … Ø's], mean $= p_2$

≐ SRS, ≐ IID →

sample: [ditto]

[1's … Ø's], $n_2 = 154$

mean $\hat{p}_2 = 48.4\%$

imaginary data: [possible $\hat{p}_2$'s]

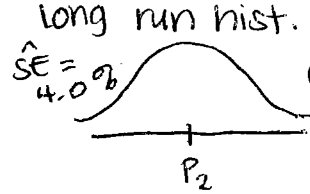
[48.4% …] ↑ ∞ ↓

Long run mean $= E(\hat{p}_2) = p_2$

est. Long run SD $= \hat{SE}(\hat{p}_2) =$

$$\sqrt{\frac{48.4\%(51.6\%)}{154}} = 4.0\%$$

long run hist.?



Inferential Summary

quantity of interest	$(p_1 - p_2)$ = diff. in rearrest rate between (T) and (C) in pop.
estimate	$(\hat{p}_1 - \hat{p}_2) = 49.3\% - 48.4\% = 0.9\%$
pract. sig.?	probably not, too small to matter
give-or-take for estimate	$\widehat{SE}_{IID}(\hat{p}_1 - \hat{p}_2) = \sqrt{(2.1\%)^2 + (4.0\%)^2} \doteq 4.5\%$
95% C.I. for $(p_1 - p_2)$	$(\hat{p}_1 - \hat{p}_2) \pm 2\widehat{SE}(\hat{p}_1 - \hat{p}_2) = 0.9\% \pm 2(4.5\%)$ $= 0.9\% \pm 9\% = (-8.1\%, 9.9\%)$

null: (obs. diff. is just due to unlucky sample) $(p_1 - p_2 = 0)$ (devil's advocate)

→ since null value of Ø is (comfortably) inside our 95% C.I., null looks OK: not stat. sig.

b) also 2-independent samples but with continuous outcome (like C.S. 15 in reader)

$\bar{Y}_1(T) = 16.8$ wks $\quad \bar{Y}_2(C) = 24.3$ wks

$S_1 = 15.9$ wks $\quad S_2 = 17.3$ wks

$n_1 = 592 \quad n_2 = 154$

(model has identical structure to (a) but with continuous outcome instead of 1/Ø)

Inferential Summary

quantity of interest	$(\mu_1 - \mu_2)$ = pop. mean diff. in wks of paid work
estimate	$(\bar{y}_1 - \bar{y}_2) = -7.5$ wks
Pract. sig.?	$\frac{\bar{T} - \bar{C}}{\bar{C}} \times 100\% = \frac{16.8 - 24.3}{24.3} \times 100\% = -31\%$ In other words, mean wks of work for (T) ppl was 31% less than (C) ppl = <u>way</u> pract. sig.
give or take for est.	$\widehat{SE}(\bar{y}_1 - \bar{y}_2) = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} = \sqrt{\frac{15.9^2}{592} + \frac{17.3^2}{154}}$ $= 1.5$ wks
95% C.I. for $\mu_1 - \mu_2$	$(\bar{y}_1 - \bar{y}_2) \pm 2\widehat{SE}(\bar{y}_1 - \bar{y}_2) = -7.5 \pm 2(1.5)$ wks $=$ -7.5 ± 3.0 wks $= (-10.5, -4.5)$ wks