

STT 200 1-26-09a

TODAY: GO OVER LECTURE OUTLINE 1-26-09

TRY TO DO AS MUCH OF 1-4 AS POSSIBLE.

ON EXAM (TUES. 2-3-09 IN RECITATION)

ASSIGNED SEATING

NO PAPERS + BOOKS ETC OPEN/IN VIEW.

NO ELECTRONICS EXCEPT CALCULATORS

ON EXAM WILL APPEAR

PORTION OF z -TABLE

$$\sqrt{p(1-p)}/\sqrt{n} \quad \sqrt{\frac{N-n}{N-1}}$$

PORTION OF t -TABLE

$$\alpha/\sqrt{n}$$

YOU WILL SUBMIT SCANTRON AND WORKED EXAM PAPER

1. $n = 100$ $\hat{p} = 23/100$ $p = \text{FRAC MSU U.G. w/ IRD.}$

SEE $\hat{q} = 77/100 = 1 - \hat{p}$ (INTEXT)

1a. Pop MSU U.G. \sim ~~5000~~ ~~55000~~ 48000? = N

1b. [POINT EST OF \hat{p}] = .23 (i.e. $\hat{p} = .23$)

1c. ESTD STD ERROR OF $\hat{p} = \frac{\sqrt{.23 \cdot .77}}{\sqrt{100}}$

1d. ESTD MARGIN OF ERROR
OF $\hat{p} = 1.96$ ESTD S.E

BECAUSE $\hat{p} \sim \text{NORMAL}$

$$\approx 1.96 \frac{\sqrt{.23 \cdot .77}}{\sqrt{100}}$$

1e. 95% CI for p OBJECTIVE

$$\hat{p} \pm 1.96 \frac{\sqrt{\hat{p}\hat{q}}}{\sqrt{n}}$$

FROM ABOVE

1f. [~ PROBABILITY THAT 95% CI COVERS p ?]

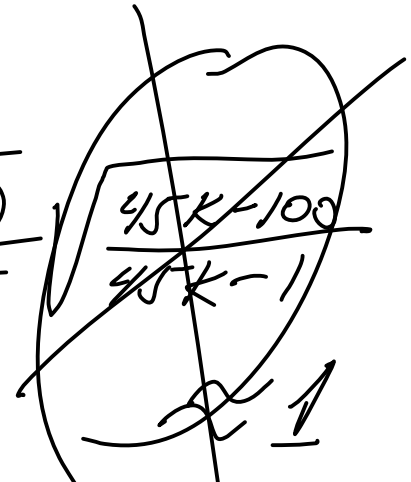
ANS. $\approx .95$

1g. DO NOT KNOW (TYPICALLY) IF 95% CI (WE HAVE IN OUR HAND) COVERS p .

1h. 00001 \rightarrow 3868

3729 REPEAT etc

37299 07196 ~~98642~~
OUT OF RANGE



1. FPC (FINITE POPN CORRECTION) $\sqrt{\frac{N-n}{N-1}} \approx 1$.
No impact -

2. Popn MSU U.G. $n=50$ X = TUITION
TARGET IS μ = AVG TUITION PAID BY MSU U.G.
Sample $\bar{X} = 8162.86$ $\alpha = 1105.27$

1.a. Pop MSU U.G.

1.b. [POINT EST OF μ] = $\bar{X} = 8162.86$

1.c. EST^d STD ERR OF \bar{X} = (EST OF LIST OF ALL POSS \bar{X} YOU MIGHT HAVE GOTTEN)
 $= \frac{\alpha}{\sqrt{50}} \sqrt{\frac{N-n}{N-1}}$

1.d. EST^d MARGIN OF ERROR = $1.96 \frac{\alpha}{\sqrt{50}}$ (≈ 1 FPC)

1e. 95% C.I for μ ? $\bar{X} \pm \text{EMOE}$

PROB

$$\bar{X} \pm 1.96 \frac{\sigma}{\sqrt{n}} (\approx 1)$$

$$8162.86 \pm 1.96 \frac{1105.27}{\sqrt{50}}$$

1f. $\approx 95\%$ PROB

1g. TYPICALLY NOT

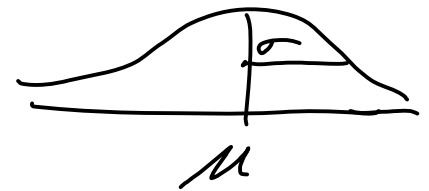
$$1h. 8162.86 \pm 1.0 \frac{1105.27}{\sqrt{50}}$$

↳ NOT 1.96

1i. 100 PERSONS EACH SAMPLES 50 STUDENTS.
(THESE 100 SAMPLES OF 5 ARE INDEP GATHERED).

ANS. ~ 68 OF 100 TRYS.

Ex. Suppose pop of MSU U.G. TUITIONS \approx
 TOY EXAMPLE



SAMPLE ONLY $n = 5$ STUDENTS.

is NORMAL
 ALREADY ASSUMING
 $N \sim \infty$

95% CI for μ
 \uparrow
 AVE TUITION
 MSU U.G.

~~$\bar{x} \pm 1.96 \frac{s}{\sqrt{n}}$~~ ~~FPC $\sqrt{\frac{N-n}{N-1}} \approx 1$~~
 NEED \dagger ENTRY, $DF = n - 1 = 4$

$8162.86 \pm 2.776 \frac{1105.27}{\sqrt{5}}$ NOT A
 PLAYER
 BECAUSE
 Pop \sim NORMAL

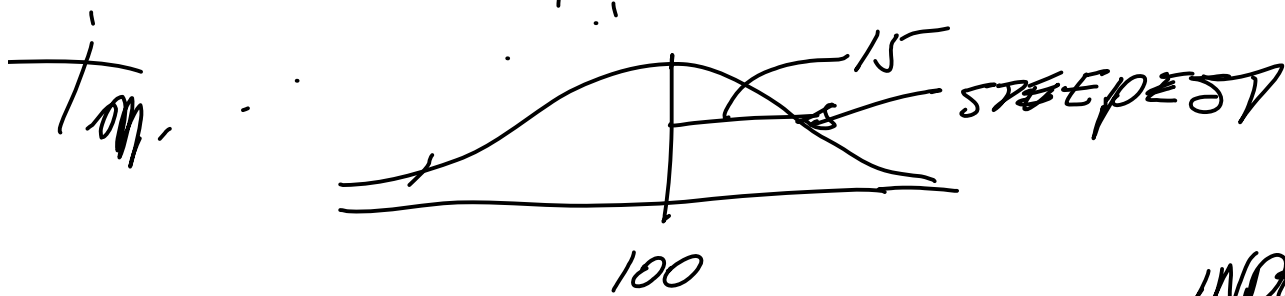
\downarrow
 t
 (DF 4)

($n = 5$)
 DATA

t	
DF	
4	2.776
	1.96
	95%

1k. CHANCE THAT 95% CI COVERS μ IS EXACTLY 95%

1l. CASEY STUDENT, GUINNESS'



3-4 $\hat{p}_M = \frac{16}{50} = .32$

$\hat{p}_W = \frac{14}{80}$



[PT EST OF $p_M - p_W$] 15 $\hat{p}_M - \hat{p}_W = \frac{16}{50} - \frac{14}{80}$

ESTD S.E OF $\hat{p}_M - \hat{p}_W$
BIG DEAL

95% CI
50 ~ ∞
80 ~ ∞

$\left(\frac{16}{50} - \frac{14}{80}\right) \pm 1.96$

$\sqrt{\frac{\frac{16}{50} \frac{34}{50}}{50} + \frac{\frac{14}{80} \frac{66}{80}}{80}}$

ST 2200 1-26-09.

TODAY: TRY TO COVER 1-4 OF 1-26-09
LECTURE OUTLINE.

EXAM 1 NEXT TUES IN YOUR RECITATION.

~ 20 QUESTIONS

SUBMIT YOUR SCANTRON AND YOUR EXAM PAPER.

SHOW METHODS - FORMULA -

NO EXTRA PAPERS ALLOWED

HAVE CALCULATOR - NO OTHER ELECTRONICS

NO BOOKS/PAPERS ETC IN VIEW

SEATING ASSIGNED -- 15 MIN

LEC. OUTLINE 1-26-09

1. $n=100$ Pop is MSU U.G., $p = \text{FRAC MSU U.G. WITH IPOD}$
 (POPULATION)
 $\hat{p} = \frac{23}{100} = .23$ (SAMPLE)

1a. Pop N = MSU U.G.

1b. POINT EST OF p IS SAMPLE PROP^N $\hat{p} = .23$

1c. EST STD ERROR OF \hat{p} = $\frac{\sqrt{\hat{p}\hat{q}}}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$
 $= \frac{\sqrt{.23(.77)}}{\sqrt{100}} \sqrt{\frac{45K? - 100}{45K - 1}}$

NOTE. ACTUAL STD ERROR OF \hat{p} IS $\frac{\sqrt{pq}}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}} \approx 1$ = ACTUAL S.D. OF LIST OF ALL POSSIBLE \hat{p}

1d. ESTD MARGIN OF ERROR OF \hat{p} :

$$1.96 \frac{\sqrt{p\hat{p}}}{\sqrt{n}}$$

WHY? THE LIST OF ALL POSSIBLE \hat{p}
IS APPROX NORMAL.

$$1.96 \frac{\sqrt{.23 \cdot .77}}{\sqrt{100}}$$

SO 1.96 BECOMES RELEVANT.

1e. 95% CI for p ?

- TARGET -

$$\hat{p} \pm 1.96 \frac{\sqrt{.23 \cdot .77}}{\sqrt{100}}$$

.23

1f. APPROX PROB

THAT 95% CI FOR p COVERS p ?

ANS.
≈ .95

1g. WE DON'T KNOW IF 95% CI
HAS INDEED COVERED p .

1h. Suppose $N = \text{MSU U.G.} = 38687$.

STUDENT LIST HAS 00001, ..., 38687.

RANDOM DIGITS $\underline{37299}$ $\underline{07196}$ $\underline{9864}$ $\underline{37299}$ 23185
 TAKE TAKE SKIP DONOT TAKE (DUPLICATE) etc

- 1c. HAS FPC HAD MUCH IMPACT ON 95% CI?

FPC
 FINITE POPN CORRECTION
 $\sqrt{\frac{N-n}{N-1}}$

ANS NO $N \sim \infty$ $\sqrt{\frac{39k-100}{39k-1}} \approx 1$

2, $n = 50$ POP MSU U.G. $X = \text{TUITION}$
 $\bar{x} = 8162.86$ $s = 1105.27$

2a. Pop = MSU. U.G.

"PLUG-IN"

2b. POINT EST OF μ IS

$$\bar{x} = 8162.86$$

↳ Pop'n
MEAN

DO TO THE SAMPLE

WHAT YOU WOULD LIKE

TO DO TO THE POPULATION.

2c. ESTD STD ERROR OF \bar{x} ?

(NOTE: ACTUAL STD ERROR OF \bar{x}

IS THE SD. OF THE LIST OF ALL POSSIBLE \bar{x})

OUR EST OF THIS IS SIMPLY $\frac{s}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$

$$= \frac{1105.27}{\sqrt{50}} \sqrt{\frac{38K-50}{38K-1}}$$

2d. ESTD MARGIN OF ERROR OF \bar{x} ?

ANS. $1.96 \frac{1105.27}{\sqrt{50}}$

2e. WHAT IS THE 95% CI FOR μ .

$$\bar{x} \pm 1.96 \frac{s}{\sqrt{n}}$$

PT 57

$$8162.85 \pm 1.96 \frac{1105.22}{\sqrt{50}}$$

2f. APPROX PROB THAT 95% CI FOR μ WILL COVER μ ? ANS. $\approx .95$

2g. Is it known whether CI has covered μ ?
* TYPICALLY NOT!!

2h. 68% CI FOR μ ?

$$\bar{x} \pm 1.96 \frac{1105.22}{\sqrt{50}}$$

for 95% CI

1.0 for 68% CI

Zi. 100 STUDENTS EACH MAKE A 68% CI
FOR μ (AVG MSU TUITION). AROUND 68
WILL HAVE THEIR CI COVER μ .