AMS 7
29 Oct 08

this time: inference for proportions;

next time: hypothesis testing; sample size determination

read: T+T ch. 1, 2, 3, 5, 6, 7

lab 3 due not this Fri, next Fri

hwk 3: current due date: Thu 6 Nov; may slip back 1 class

95% CI for μ in intertidal crabs temperature case study: (24.5°C, 25.6°C)

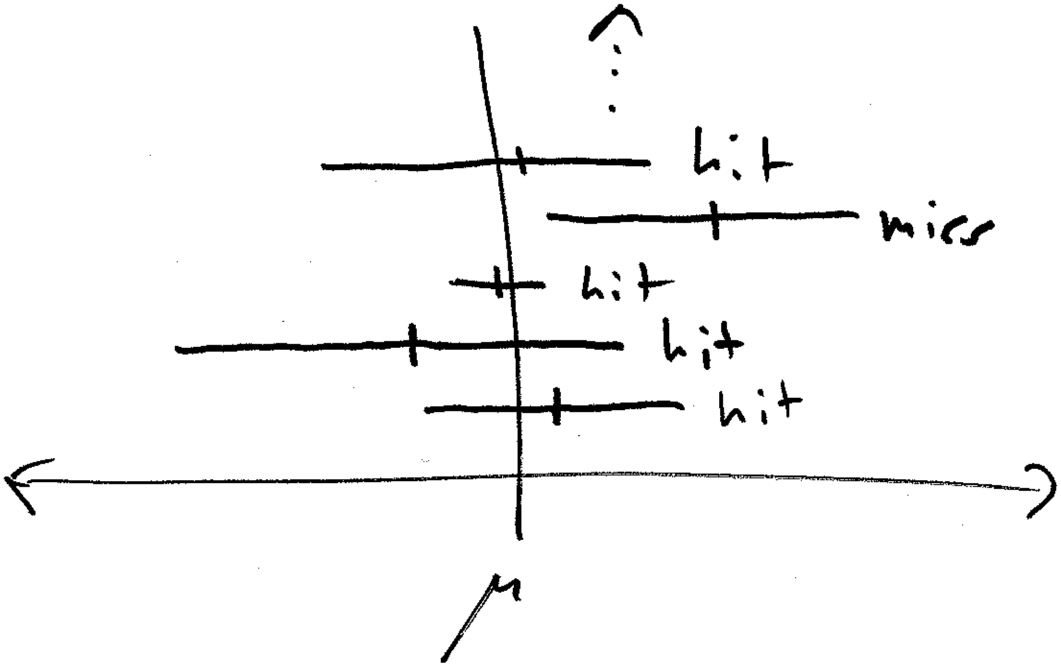
$$24.5 \quad 25.0 \quad 25.6$$

Q: does this mean that $P_f(24.5 < \mu < 25.6) = 95\%$? A: unfortunately no

no: μ is a fixed unknown constant that doesn't change when we repeat anything

solutions to hwk 1 + 2 are in glass case near Baskin 125

PLAN AHEA



about 95% of these intervals, should be hits

+

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pop	ask biologists who ran expt.	sample	imag data
all relevant lab rats		the observed lab rats	possible values of $\hat{p}$

L?

actual ~~like SRS~~ = IID

L?

1 = L

0 = R

N = ? (big)

(1s & 0s)

(1s, 2 0s) n = 12

"p-hat"

mean $\bar{y} = \hat{p} \doteq 0.83 \doteq 83\%$

(83%, 75%, …) $M \to \infty$

mean $\mu = p = ?$

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

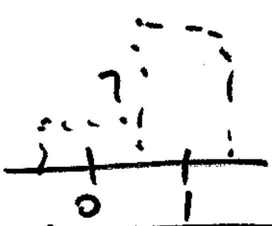
hyp. IID

(2s, 4 0s) n = 12

mean $\hat{p} = ?$ (ex. 75%)

long run mean: EV of $\hat{p}$ = p

est. long run SD: $\hat{SE}$ of $\hat{p} \doteq 11\%$



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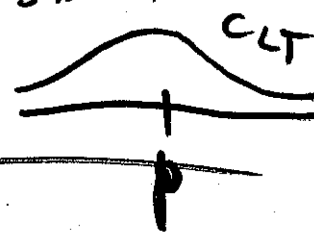
math Fact: in a 0-1 population, with mean p,

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

long run hist



inferential summary

~~(unknown pop)~~	
quantity of interest ~~(main)~~	p = pop. % of ~~(relevant)~~ rats who would turn in this maze
estimate of p	$\hat{p} = 83\%$
give or take for $\hat{p}$ as est. of p	$\widehat{SE}_{IID}(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \doteq 11\%$
95% CI for p	$\hat{p} \pm 1.96\, \widehat{SE}(\hat{p}) = (61, 100)\%$ (trunc. at 100%)

pop / sample / data / time ↓

EV of $\hat{p}$ = $E_{IID}(\hat{p}) = E_{IID}(\bar{y}) = \mu = p$

so $\boxed{E_{IID}(\hat{p}) = p}$

$\widehat{SE}$ of $\hat{p}$ = $\widehat{SE}_{IID}(\hat{p})$

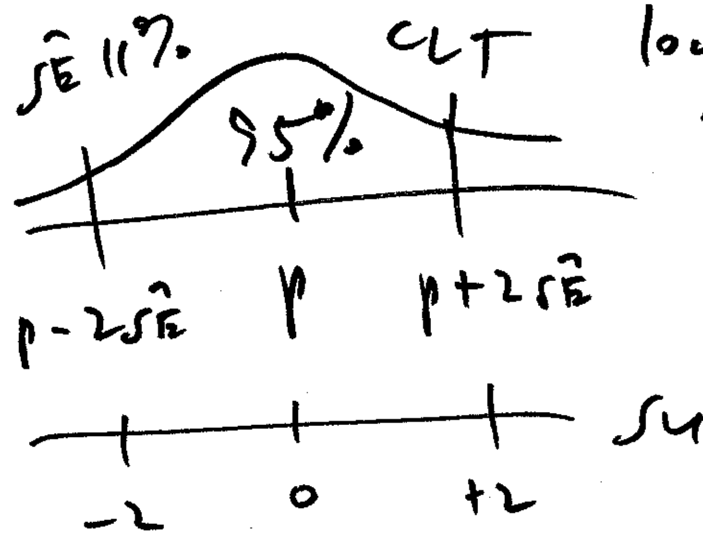
$$= \widehat{SE}_{IID}(\bar{y}) = \frac{\hat{\sigma}}{\sqrt{n}} = \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

so $\widehat{SE}_{IID}(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{(0.83)(0.17)}{12}}$

$\doteq 0.108 \doteq 11\%$

approx. 95% CI

for p, assuming CLT gives a good normal curve in imag. ~~data set~~

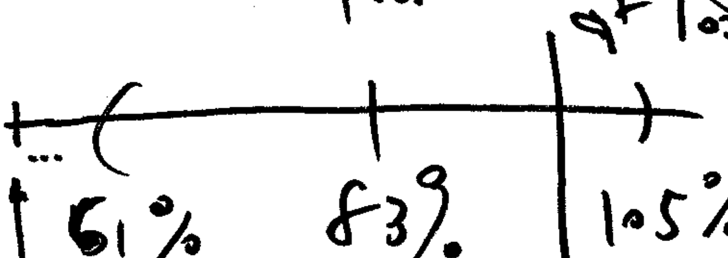


approx. long run hist of $\hat{p}$ (n large)

so $\hat{p}$'s approx (large n)

95% CI for p:

$\hat{p} \pm 1.96\ \hat{SE}(\hat{p})$
(2)

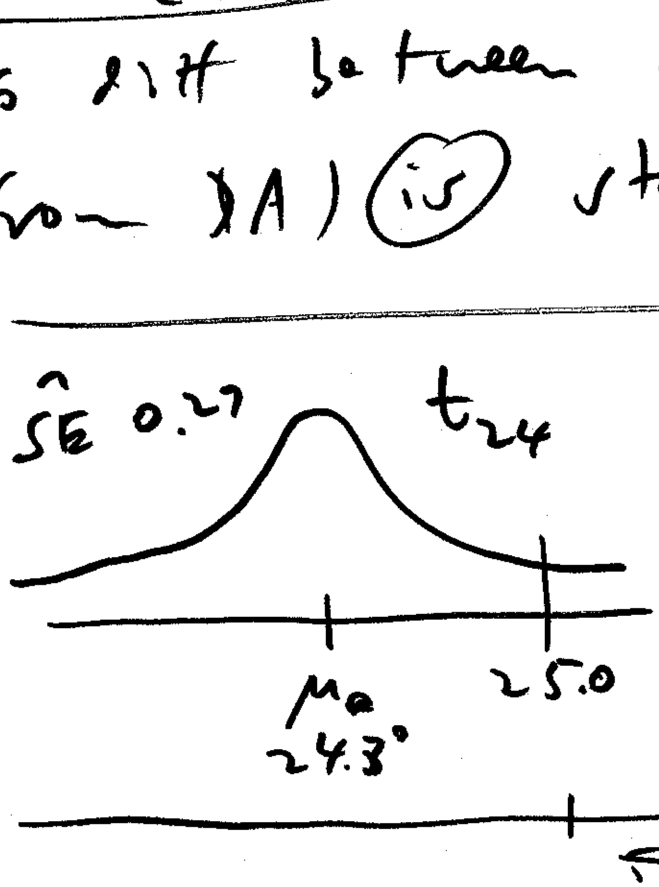


50% devil's advocate value (DA)

(61%, 100%)

50% DA value may not in 95% interval

so diff between 83% ($\hat{p}$) & 50% (p_0, from DA) is statsig (& also practsig)



long run hist of $\bar{y}$ if null true, accounting for uncertainty in σ

$(25.0 - 24.3)/0.27 \doteq 2.6$