this time: estimation

next time: hypothesis testing

JW new office BE 308

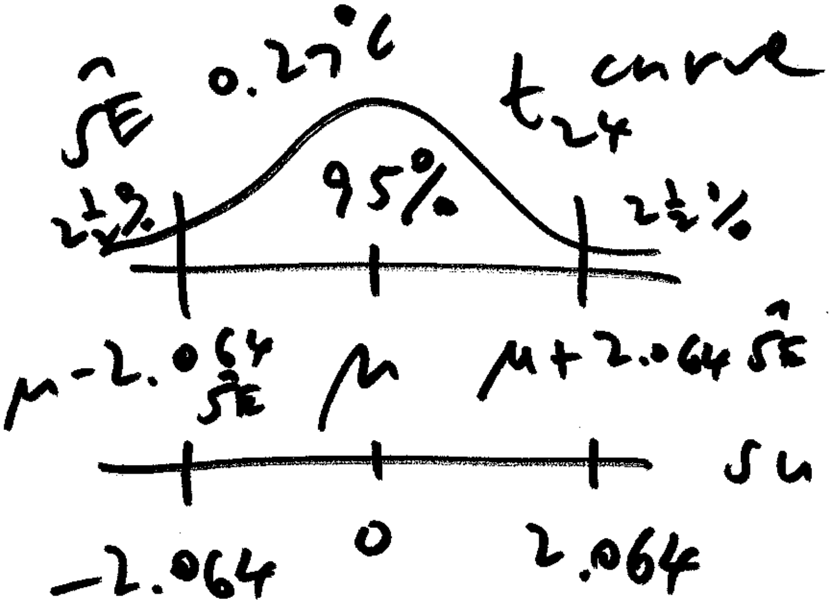
AMS 7 29 Oct 09

midterm due Thu 29 Oct

new date: lab 3 due by 5 pm **Mon** 2 Nov

TAs for labs + discussion sections will change starting tomorrow

all office hours start at Baskin white boards



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

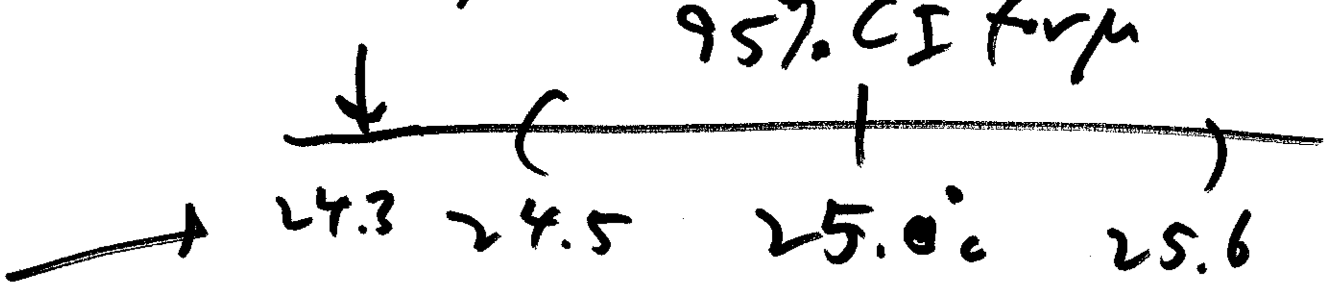
Neyman

$\bar{y} \pm 2.064\,\hat{SE}(\bar{y})$ = 95% confidence interval for μ

$\uparrow\ t_{n-1}^{0.95}$

$25.0^\circ C \pm 2.064\,(0.27^\circ C)$

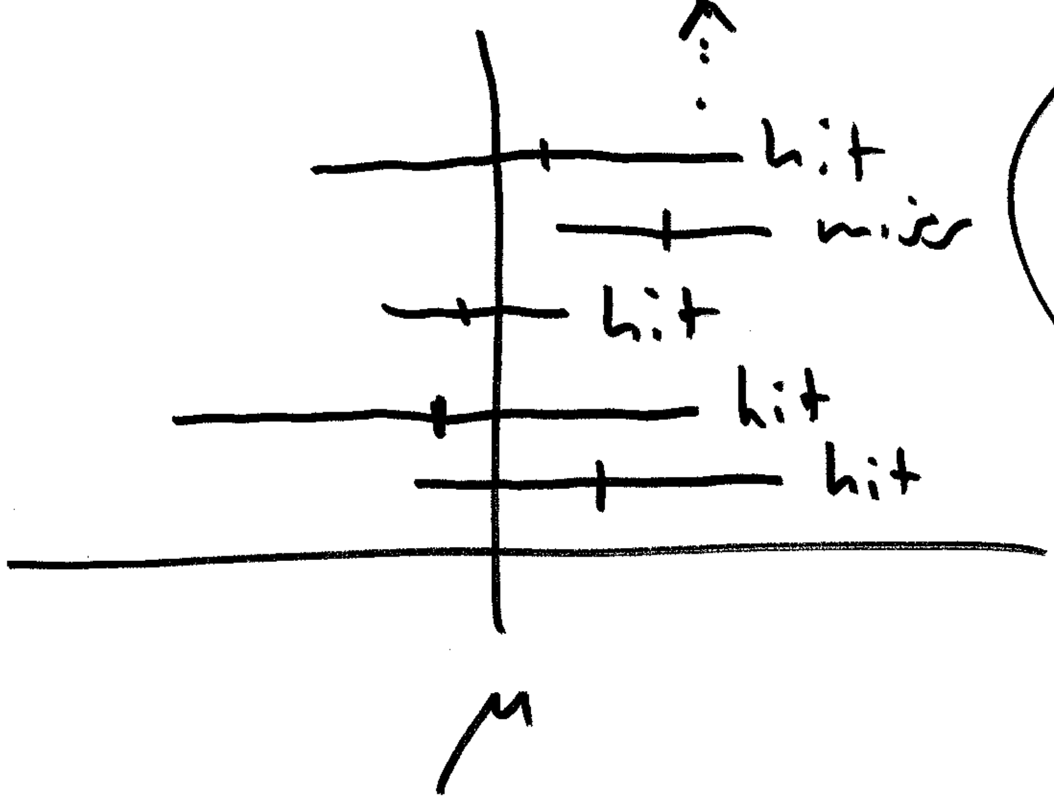
$= (24.5^\circ C,\ 25.6^\circ C)$



theory value μ_0

since μ_0 is not in 95% CI, the data <u>do not</u> support the theory at that conf. level

conf. level	what's left in tails
95%	5%
99%	1%
90%	10%



about 95% hits

inferential summary

pop.	unknown (pop.) quantity of main interest	p = pop. proportion of rats that would turn
given data + sample	estimate of p	$\hat{p} = 83\%$
	give or take for $\hat{p}$ as est. of p	$\widehat{SE}(\hat{p}) = \sqrt{\frac{(0.83)(0.17)}{12}} \doteq 11\%$
	95% CI for p	

(4)

pop: all rats from Grant spring | 1 = L, 0 = R | sample: the observed rats | imag data: all possible $\hat{p}$s

L?

$N = ?$ (big) [1s & 0s]

mean $\mu = p = ?$

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

pop hist

0 1

actual

like

SRS ≐ IID

happ: SRS

L?

[1s, 2 0s] $n = 12$

mean $\bar{Y} = \hat{p}$

$= \frac{10}{12} \doteq 83\%$

sample hist

0 1

[2s, 2 0s] $n = 12$

mean $\hat{p} = ?$

(ex. 75%)

[83%, 75%, ⋮] $M = \infty$

long run $\boxed{1}$ expected value of

mean $\hat{p} = p$

long run $\boxed{2}$ standard error

SD of $\hat{p} =$

long run $\boxed{3}$ hist

p

$\boxed{1}$ EV of $\hat{p} = E_{IID}(\hat{p}) = E_{IID}(\bar{Y})$

$= \mu = p$ ∴ $E_{IID}(\hat{p}) = p$

est. SE of $\hat{p}$ $= \widehat{SE}_{IID}(\hat{p}) = SE_{IID}(\bar{y})$

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

~~reminder~~ math fact: if pop has only 2 values,

$$\sigma = \left[\begin{pmatrix}\text{larger}\\\text{value}\end{pmatrix} - \begin{pmatrix}\text{smaller}\\\text{value}\end{pmatrix}\right] \sqrt{\begin{pmatrix}\text{proportion}\\\text{of}\\\text{larger}\\\text{value}\end{pmatrix}\begin{pmatrix}\text{prop.}\\\text{of}\\\text{smaller}\end{pmatrix}}$$

here larger = 1, smaller = 0

$$\sigma = (1-0)\sqrt{p(1-p)}$$

new math fact: with 0-1 populations,

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