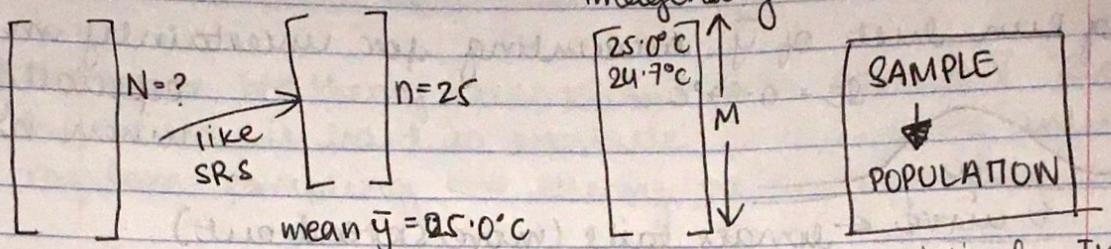
Nikeila Kadiyala

Tuesday
6th November

Question to ask: What is the broadest scope of valid generalisability outward for the sample



Argument: μ = 24.3°C but $\bar{y}$ = 25.0°C because of unlucky random sampling

Inferential summary

unknown pop. quantity of main interest	μ = POP mean
Estimate of μ	$\bar{y}$ = 25°C
Give or take for $\bar{y}$ as an est. of μ	$\hat{SE}_{110}(\bar{y})$ = 0.27°C

- M should be a big ## (img data) → all possible values

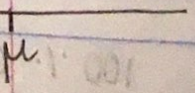
What would long Run Mean, SD and hist. be?

long Run: mean (EV)	μ
EXPECTED long Run SD $(\hat{SE})_{110}$	$\frac{\sigma}{\sqrt{n}} \Rightarrow \frac{s}{\sqrt{n}} = 0.27°C$
hist:	

for SE: we don't have σ!
estimated long run SD = $\hat{SE}_{110} = \frac{s}{\sqrt{n}}$

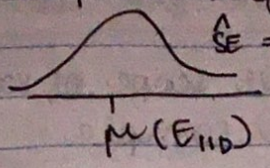
EV = $E_{110}(\bar{Y}) = \mu$ of $\bar{Y}$

$SE_{110} = \frac{\sigma}{\sqrt{n}}$ how much fluctuation should we expect to see?



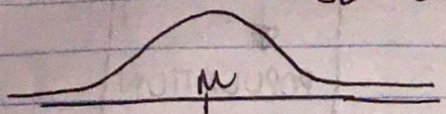
on the basis of this data set, we think that μ is around 25°C ($\bar{y}$) give or take about 0.27°C ($\hat{SE}(\bar{y})$)

• By Part 2/3 of the CLT, we will obtain a normal histogram for imaginary data



Long run dist of $\bar{y}$, accounting for uncertainty in σ (especially $\hat{\sigma}$ when n is small)

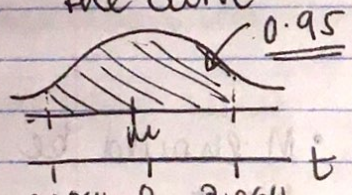
$SE = 0.27°C$



t curve ← longer tails (more spread out)

t_{n-1} = t curve with n degrees of freedom

↙ Use corresponding t-table for values of area under the curve.



$\mu - 2.064\,\hat{SE}$ ↖ $\mu + 2.064\,\hat{SE}$

$n=25$
$t=24$

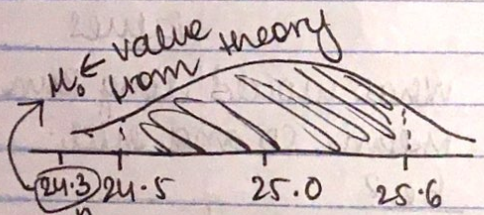
$P(\mu - 2.064\,\hat{SE} < \bar{y} < \mu + 2.064\,\hat{SE}) = 0.95 = 95\%$

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

* Neyman's confidence Trick

$\mu - 2.064\,\hat{SE} < \bar{y}$

$\Rightarrow \mu < \bar{y} + 2.065\,\hat{SE} \Rightarrow \bar{y} - 2.064\,\hat{SE} < \mu$



** If

$25.0°C \pm 2.064(0.27°C) = 25.6\,(24.5, 25.6)°C$

Informally we're pretty sure μ is b/w 24.5 – 25.6°C (95% confidence)

⇒ on the basis of this picture, the theory is probably wrong.

① Since theory value $\mu_0 = 24.3$ for μ is not in the 95% CI for μ we conclude that the theory is probably wrong.

↳ only 95% confidence

100% CI → whole # line ∴ useless.

(2) The difference b/w 24.3 and 25 is statistically significant at the 95% level of confidence.

DIFFERENT QUESTION: Is the difference practically significant? (25 - 24.3) @95% conf

Question hard to answer w/o expertise

Difference b/w theory value μ_0 and data value $\bar{Y}$ stat sig difference is hard to attribute to ~~clinically~~ unlucky random sampling $\leftrightarrow$ theory probably wrong.

Is confidence = probability?

95% for $\mu = (24.5, 25.6)$; does this mean that the prob. $P(24.5 \leq \mu \leq 25.6) = 95\%$? NO!

NO, μ is a fixed unknown # that is either in or out of CI

what does conf. mean if not probability?:

→ 95% ~~times~~ of intervals will be hits. (CIs)

(NEYMAN'S GUARANTEE) - confidence in process by which you build interval.

NOT OUTCOME of whether CI is Hit/Miss