this time: confidence intervals

next time: for means & proportions

read: LN pp. L-145 → L-160

AMS 7
15 May 17

intertidal crabs p. L-139 case study

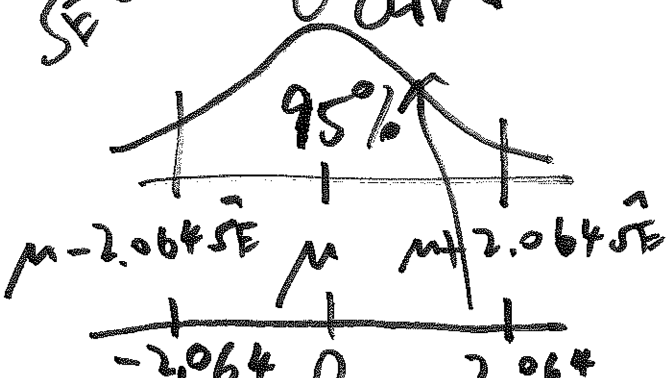
On the basis of this dataset I think μ is around 25.0°C ($\bar{y}$) give or take about 0.27°C ($\hat{SE}(\bar{y})$), & I'm 95% confident that μ is somewhere between 24.5°C & 25.6°C

normal curve: $\bar{y} \pm 2\,\hat{SE}$ (1.96) for 95% conf.

$\hat{SE}$ 0.27°C

t curve

long run hist of $\bar{y}$, accounting for uncertainty in σ (& with a sample hist. that's close to normal)



$t_{n-1} = t_{24}$ ($n = 25$)

↑ degrees of freedom

t table: areas under various t curves with various #s of degrees of freedom: LN p. L − 142

95% confidence interval (CI)

Jerzy Neyman: (Jerry) (~1930)

24.5 $\quad \bar{Y} \quad$ 25.6

25.0°C

conventional choice

$\widehat{SE}(\bar{Y}) = 0.27°C$

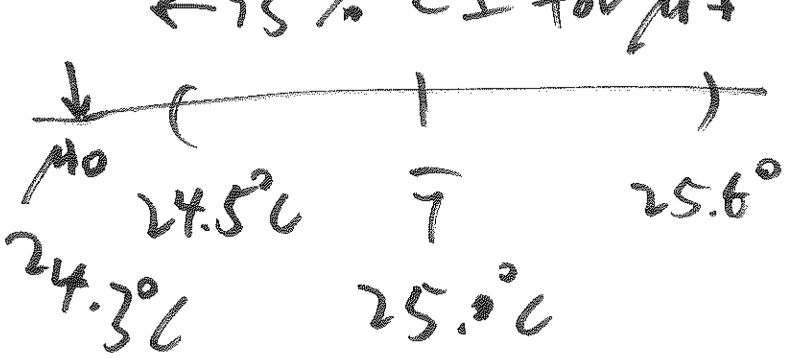
2.064 ← here

$$\bar{Y} \pm t_{n-1}^{0.95}\, \widehat{SE}(\bar{Y})$$

the # (from t table) such that the area in the middle with (n−1) d.f. is 95%

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

R − 22: $t_{n-1,\,0.95} = t_{n-1}^{0.95}$



theory value of μ: μ_0

here $\mu_0 = 24.3°C$

Since $\mu_0 = 24.3°C$ is NOT in the 95% CI for μ, the dataset does $\boxed{\text{not}}$ support the theory that $\mu = 24.3°C$

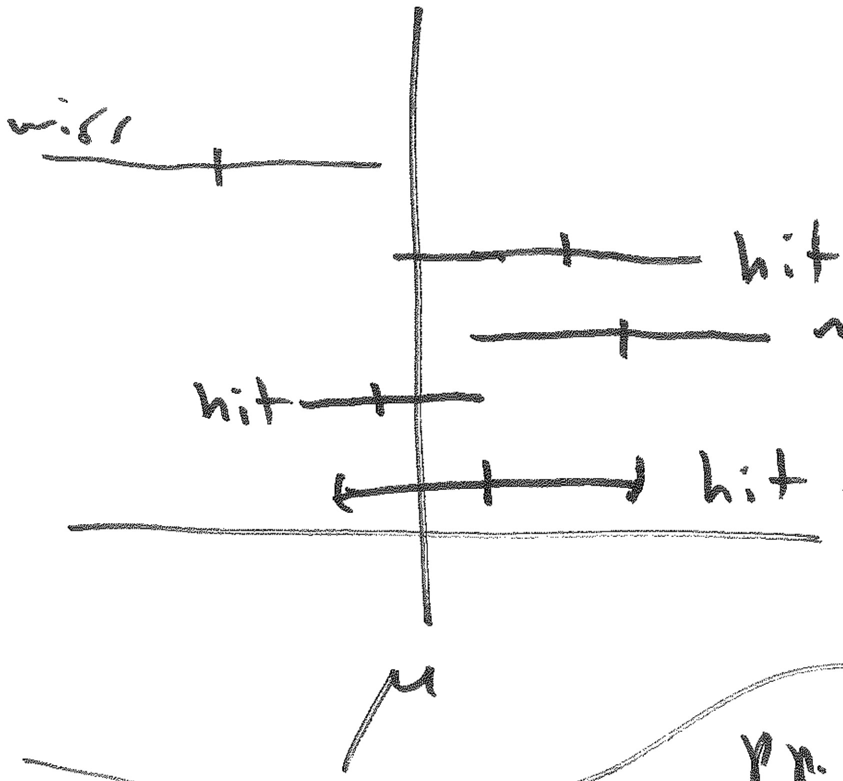
95% CI runs from 24.5°C to 25.6°C

$\boxed{Q}$ Does this mean that

$$P_{RS}(24.5°C < \mu < 25.6°C) = 95\% \, ?$$

RS: repeated-sampling (frequentist)

$\boxed{A}$ Unfortunately no: μ is just a fixed unknown #, not moving around when anything is repeated



about 95% of the CIs would include μ

: μ is in this CI

pp. L - 152 & 156