Discussion section, week of 12–16 Nov 2018

p. R-58, 59 Disc. Sec. 5 # 2

AMS 7 14 Nov 18

inferential summary ①

pop	unknown pop. quantity of main interest	μ = pop. mean calcium concentration
sample	estimate of μ	$\bar{y} = 29.8$
inf	give or take for $\bar{y}$ as est. of μ	$\hat{SE}(\bar{y}) = 0.50$
	95% CI for μ	$\bar{y} \pm t_{n-1}^{0.95} \cdot \hat{SE}(\bar{y}) = (28.7, 30.8)$

estimated (standard error)

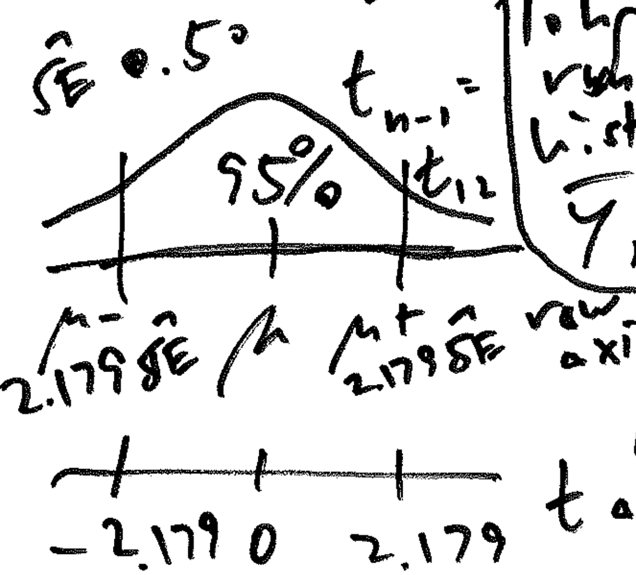
$\hat{SE}$ of $\bar{y}$ =

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

$= \frac{1.79}{\sqrt{13}} = 0.50$

(Gosset) t_{n-1} = long run hist. of $\bar{y}$, accounting for uncertainty in σ ✱

L. 142



pop ②
all arthropods similar to sample all relevant ways

sample ①
the observed arthropods

stat. inf.

imag. data ②
possible values of $\bar{y}$ ③

calcium

$N = ?$
(b_{ij})

actual
like SRS ≈ IID

calcium (y)

y_1 28
27
:
y_n 31
$n = 13$

mean $\bar{y} = 29.8$
SD $s = 1.79$

29.8
31.2
:
$M \to \infty$

pop.
mean $\mu = ?$
pop. SD $\sigma = ?$

hyp. ≈ IID

sample hist.

long run EV of $\bar{y}$ = mean $= \mu$

pop hist.

$n = 13$

mean $\bar{y} = ?$
(ex. 31.2)

est. long run SE of $\bar{y}$ = SD = 0.50

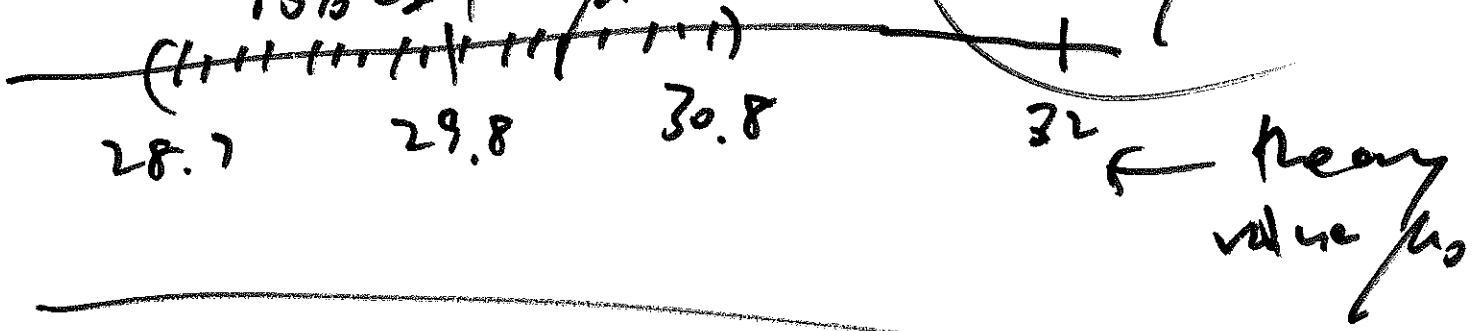
long run hist ④

EV of $\bar{y}$ = expected value of $\bar{y}$ = $E_{IID}(\bar{y}) = \mu$ ← math fact

R-22 formula ③

$\bar{Y} \pm 2.179\, \widehat{SE}(\bar{Y})$ ← 95% confidence interval (CI) for μ

$29.8 \pm (2.179)(0.50)$



since theory value ($\mu_0 = 32$) (is) (not) in the 95% CI for μ, the difference between data ($\bar{Y}_{29.8}$) & theory ($\mu_0 = 32$) (is) statistically

↔ difference is hard to attribute to unlucky random sampling ↔ theory is probably wrong

Q: ① is diff. between $\bar{x}$ (29.8) & μ_0 (32) ② practically significant (large in practical terms)? ④

A: ③ ask biologists

$$\frac{29.8 - 32}{32} = \frac{-2.2}{32} \approx 7\%$$

when this relative diff. is $\geq 5\%$, diff. is often practically significant