AMS 7
10 Feb 09

this time: statistical inference
next time: for means & proportions

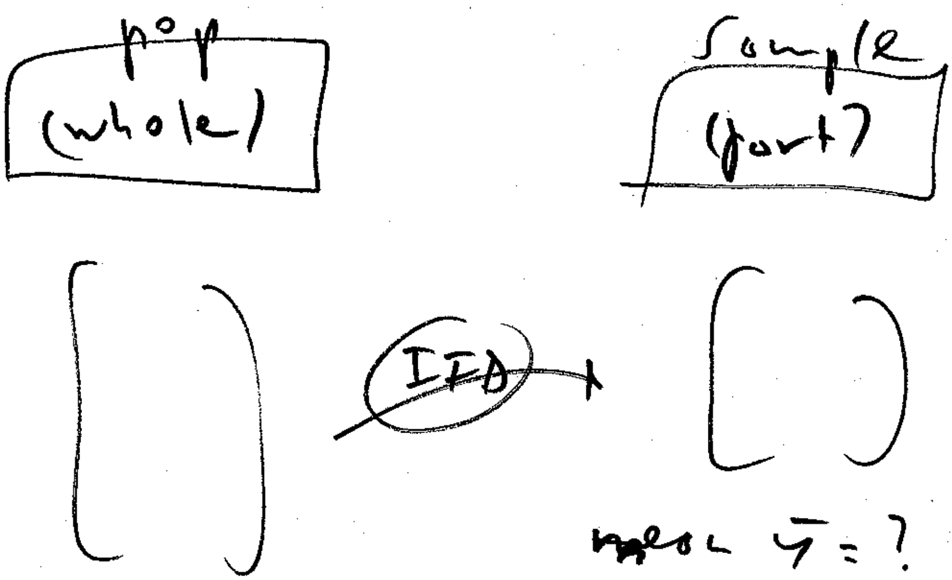
read: DD ch. 1-11

lab 3 due (by) Fri 13 Feb 5pm

take home midterm due Thu 12 Feb in class

midterm hint: DD ch. 8, 9, 10

hypokalemia



mean $\mu = 3.8$ mean $\bar{y} = ?$

(probability)
deductive reasoning
from whole to part

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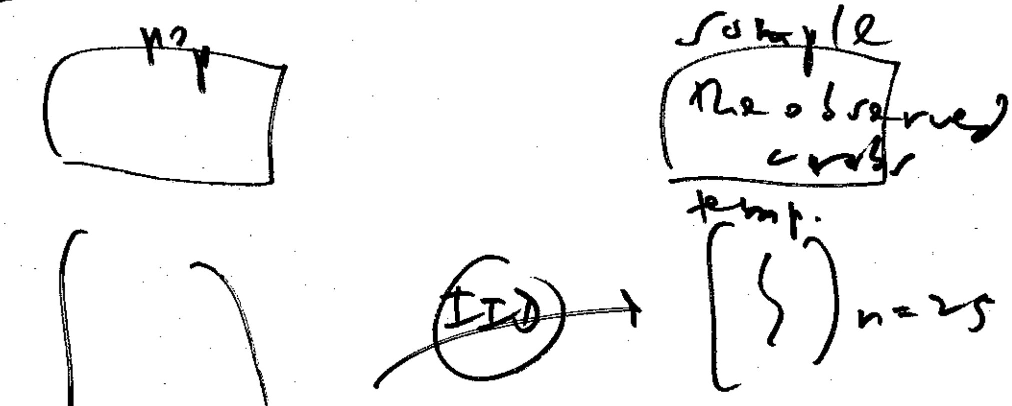
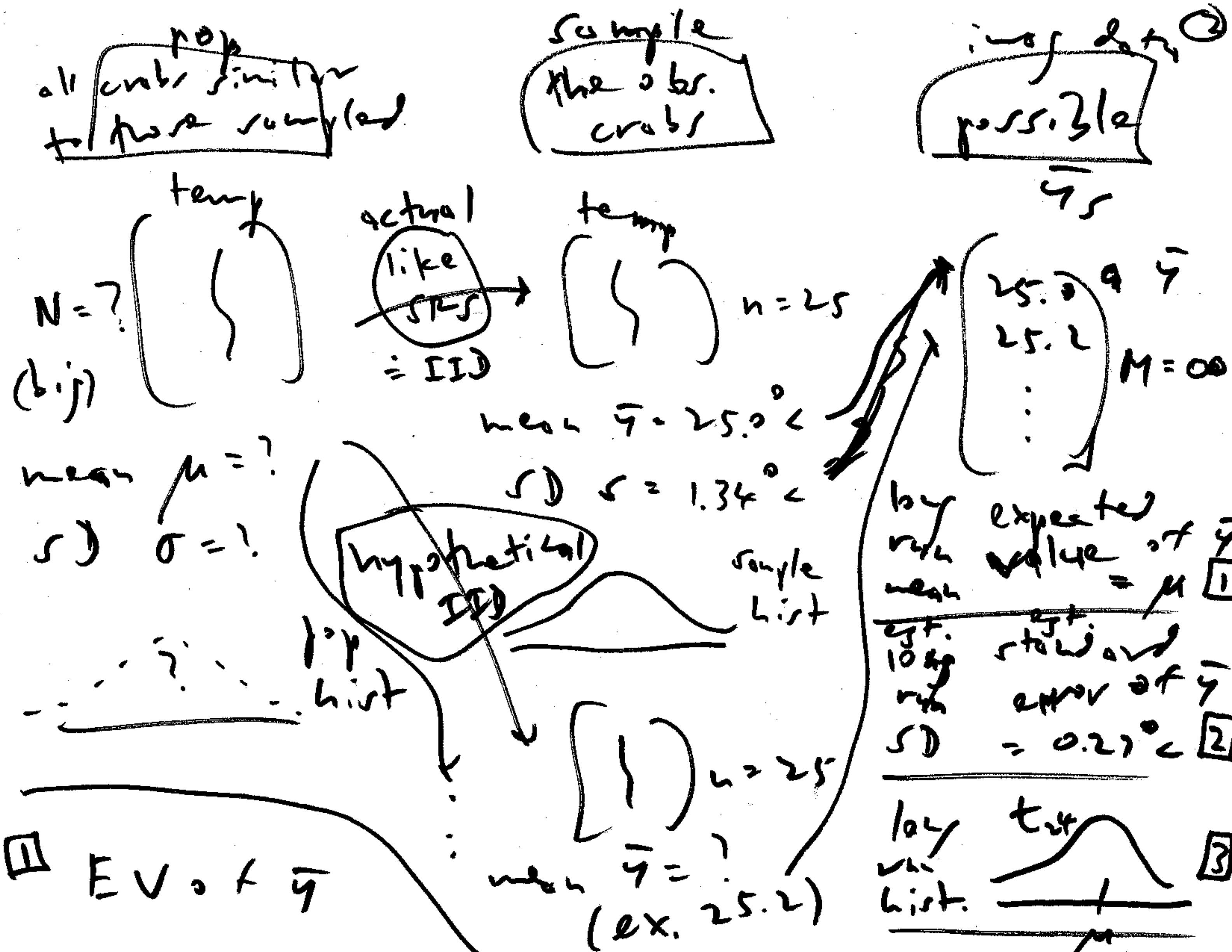
inferential
crabs



mean $\mu = ?$ mean $\bar{y} = 25.0$

inductive reasoning
(inference)
(statistical)



[1] EV of $\bar{y}$

$= E_{IID}(\bar{y}) = \mu$

[2] estimated SE of $\bar{y}$ $= \widehat{SE}_{IID}(\bar{y}) = \frac{s}{\sqrt{n}}$

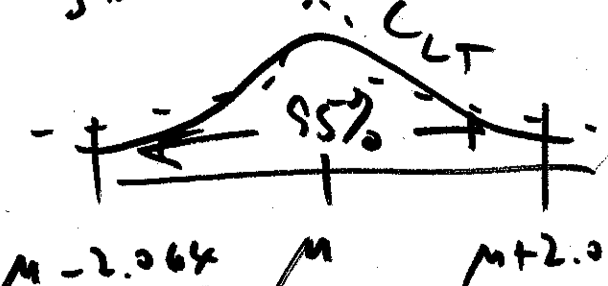
$= \frac{1.34°C}{\sqrt{25}} = 0.27°C$

inferential summary

unknown (pop.) quantity of interest	μ = pop. mean temp. at which internal body of this species would equilibrate...
estimate of μ	$\bar{y} = 25.0°C$
give or take for $\bar{y}$ as est. of μ	$\hat{SE}(\bar{y}) = \frac{s}{\sqrt{n}} \doteq 0.27°C$
95% CI for μ	$\bar{y} \pm (t^{0.95}_{n-1}) \frac{s}{\sqrt{n}} = (24.4, 25.6)°C$

(left margin: importance of sample)

$\hat{SE}$ 0.27°C t_{24} curve



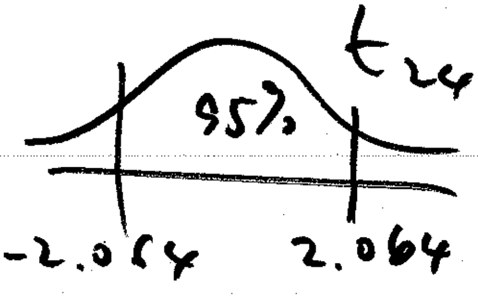
long run hist of $\bar{y}$, accounting for uncertainty in σ

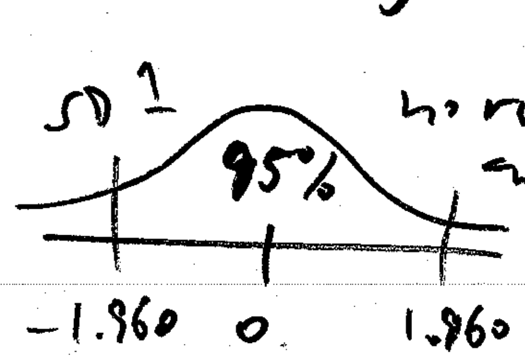
(1908) W.S. Gossett "student"

Fisher (1915)

(t machinery)

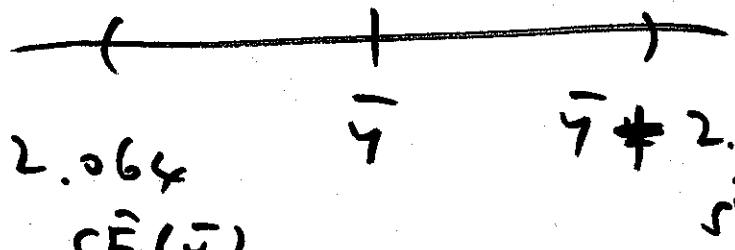
right hist = t_{n-1} curve on $(n-1)$ degrees of freedom





Jerzy Neyman: late 1920s

95% Confidence interval (CI)



for μ: $\bar{y} \pm \left(t_{n-1}^{0.95}\right) s\hat{E}(\bar{y})$

$\leftarrow$ 95% CI $\rightarrow$ 2.064 · $s/\sqrt{n}$ 0.27

24.44 25.0 25.56 °C

look and see if μ_0 is in the

μ_0 = 24.3°C = theoretical value

95% CI or not: if not in there, data do not support theory at 95% confidence level; if in it there, data do support it at that level.

Judge: diff. between $\mu_0 = 24.3^\circ C$ & $\bar{y} = 25.0^\circ C$ is statistically significant (large in statistical terms) because 24.3 is not in 95% CI