Discussion section, week of 18–22 Nov 19

p. R-63 #1

STAT 7
18 Nov 19

~~1 lb = 2.54 kg~~ (1 lb = 454 g) ①

(1 kg = 2.54 lb)

.ld:

$\mu_{old} = 28.1$ kg

$\bar{y}_{new}$: 26.0 kg

interference ↔ weight ↓ ✓

$$\frac{\bar{y}_{new} - \mu_{old}}{\mu_{old}} = \frac{26.0 - 28.1}{28.1} = \frac{-2.1}{28.1}$$

$$\approx -0.075 = -7.5\%$$ ← est. pop. weight (now)

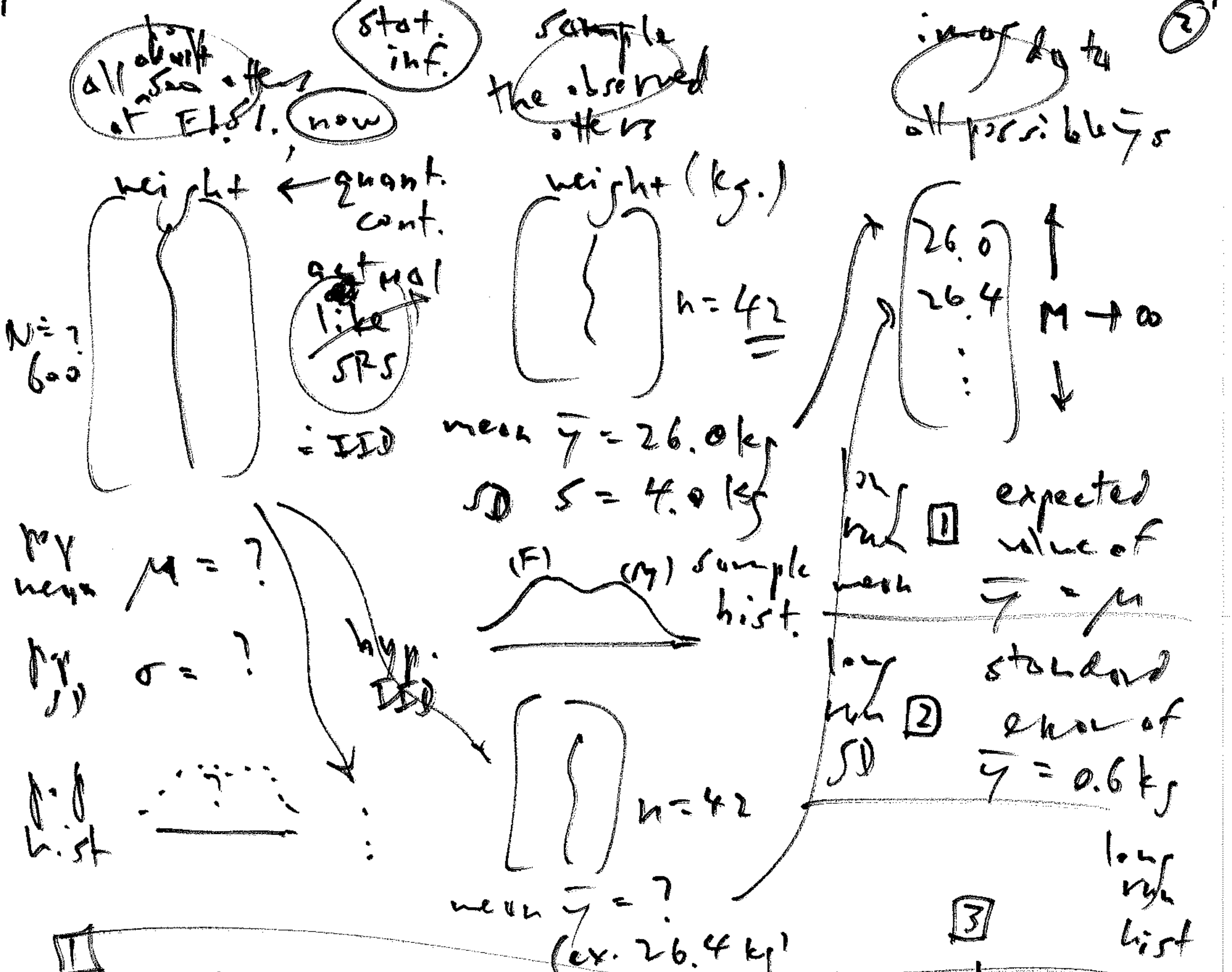
is 7.5% lower than actual pop. wt 5 years ago

$$\frac{7.5\%}{5 \text{ years}} = 1.5\%/\text{yr}$$ ← rate of weight loss

practsig

1 (9) time

small % differences may not be practsig if they only occur once, but if they accumulate over time they can be highly practsig



1 $\begin{pmatrix}\text{expected} \\ \text{value of} \\ \bar{y}\end{pmatrix} = \begin{pmatrix}\text{EV} \\ \text{of} \\ \bar{y}\end{pmatrix} = E_{IID}(\bar{y}) = \mu$

2 $\widehat{SE}_{IID}(\bar{y}) = \frac{s}{\sqrt{n}} = \frac{4.0\text{ kg}}{\sqrt{42}} \doteq 0.62\text{ kg}$

est. SE

"representative" = like at random

inferential summary

pop. summary of main interest	μ = pop. mean weight of adult mice now
estimate of μ	$\bar{y} = 26.0$ kg
give or take for $\bar{y}$ as est. of μ	$\widehat{SE}(\bar{y}) = 0.6$ kg
95% CI for μ	$\bar{y} \pm 2(0.6 \text{ kg}) = (24.8, 27.2)$

we think μ is around $\bar{y} = 26.0$ kg (EV),

give or take about 0.6 kg ($\widehat{SE}$)

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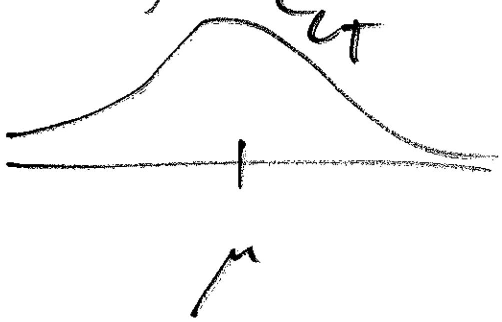
what's $p_F(\bar{y}$ differs from μ by no more than bl.h$)$?

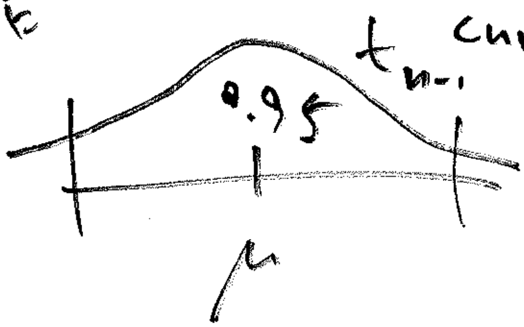
frequentist

$\hat{SE}$ 0.6 kg

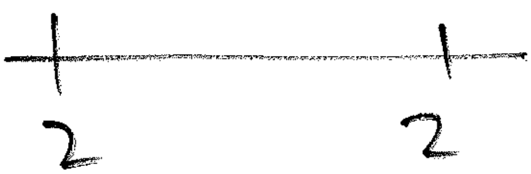


[3] long run hist. of $\bar{y}$

$\hat{SE}$ 0.6 kg

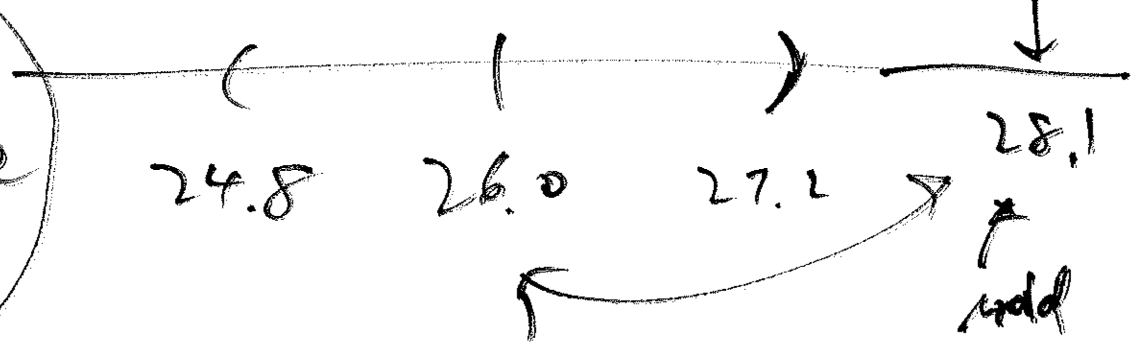


[3] long run curve hist. of $\bar{y}$, accounting for uncertainty in σ



t_{41} L 142

95% CI for μ



1(d) true

1(e) true

this diff. is stat sig.

$\bar{y}_{new} = \bar{y}_{now} = 26.0\ kg$

$\mu_{old} = 28.1\ kg$

$$\frac{\bar{y}_{now} - \mu_{old}}{\mu_{old}} = \frac{26.0\ kg - 28.1\ kg}{28.1\ kg}$$

$$= \frac{-2.1\ kg}{28.1\ kg} = -7.5\% = -0.075$$

is estimated to have
ave. wt. of Elk. Sl. Sea. Hens decreased by
7.5% over 5 yrs

$\frac{7.5\%}{5\ yrs} = 1.5\%/yr$ ave. wt. decline

→ 15% over 10 yrs

this diff. (is) practically:

small differences may not be practically if they only occur once, but if they accumulate over time they can be highly practically. R - (63) #1 10th true ↑

"representative" = like at random

(6)

pop. all Elig. sl. adult sea otters, now — sample: the observed otters — imag. data: all possible $\bar{y}$s

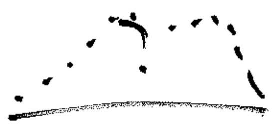
weight	(y) weight ← quant. cont.	
$N \doteq 600$	(actual) like SRS $\doteq$ IID	~~n~~ (n) = 42
	$y_1, \ldots, y_n$	26.0 kg — a $\bar{y}$
		25.8 — another $\bar{y}$
	mean $\bar{y} = 26.0$ kg	$\uparrow$ μ + to $\downarrow$
	SD $s = 4.0$ kg	

pop mean $\mu = ?$

pop SD $\sigma = ?$

hyp. IID

sample hist.



pop. hist.

n = 42

mean $\bar{y} = ?$ (e.g. 25.8 kg)

long run mean [1] expected value of $\bar{y} = \mu$

est. long run SD [2] est. standard error of $\bar{y} \doteq 0.6$ kg

[3] ? long run hist.

[1] $\begin{pmatrix}\text{expected value of } \bar{y}\end{pmatrix} = E_{IID}(\bar{y}) = \mu$ R-(L2) ← form. (3)

[2] $\begin{pmatrix}\text{estimated standard error of } \bar{y}\end{pmatrix} = \widehat{SE}_{IID}(\bar{y}) = \frac{\not{\sigma}\, s}{\sqrt{n}} = \frac{4.0 \text{ kg}}{\sqrt{42}} \doteq 0.6$ kg

inferential summary

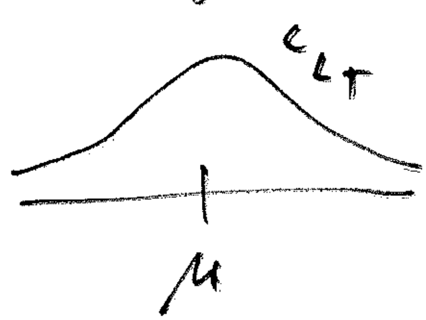
pop.	unknown pop. quantity of main interest	μ = pop. mean wt. of adult Elk. gl. otters, now
imag. data + sample	estimate of μ	$\bar{y} = 26.0$ kg
	give or take for $\bar{y}$ as ~~est.~~ of μ	$\hat{SE}(\bar{y}) = 0.6$ kg
	95% CI for μ	$\bar{y} \pm 2\,\hat{SE}(\bar{y})$ $[26.0 \pm 2(0.6)]$ kg =

we think μ is around $\bar{y} = 26.0$ kg,

give or take around $\hat{SE}(\bar{y}) \doteq 0.6$ kg

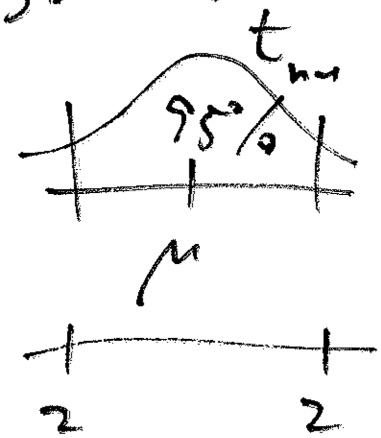
$\hat{SE}$ 0.6 kg

[3] long-run hist of $\bar{y}$



$\hat{SE}$ 0.6 kg

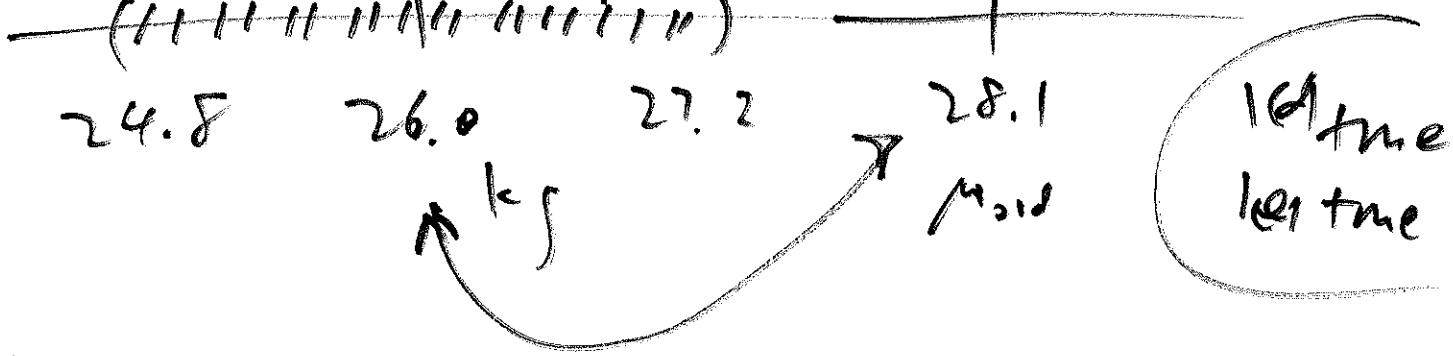
[3] long-run hist. of $\bar{y}$, accounting for uncertainty in σ



$n-1 = 41$

L-(142)

95% CI for μ



this diff (is) stat sig since 28.1 is (not) in the 95% CI