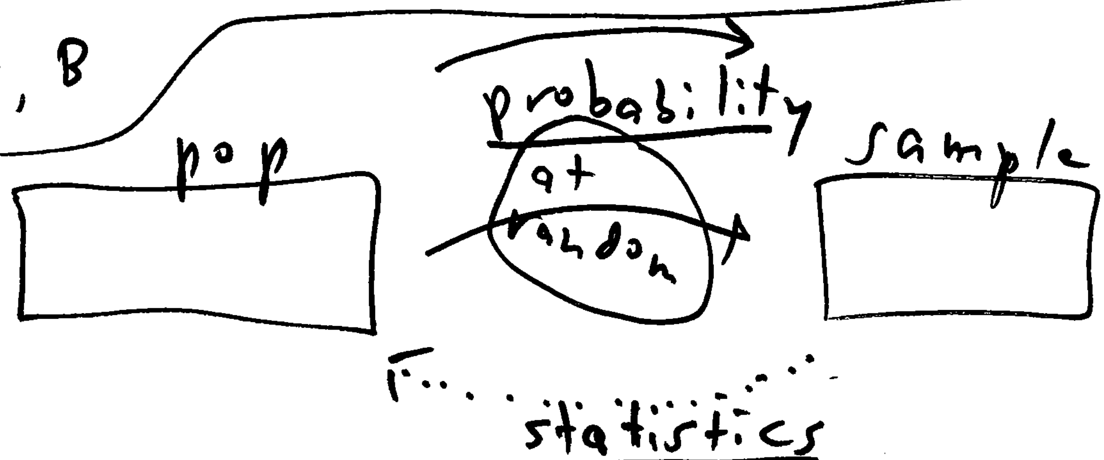
this time:	estimating a population mean	3 May (1)
next time:	estimating a population percentage	AMS 5 main
read: FPP ch. 20, 21	way to improve class: legibility & logical flow of document camera notes	

solution: 2 or 3 people in class will be paid & given extra credit to create legible & logical notes, which will be posted on web along with my chicken scratches

in big syllabus picture: now: V A, B



if pop known, we reason from pop to sample (whole → part) (deductive reasoning); if sample drawn at random this is probability in action

1.5

(updated copy of p 6 from lecture notes of 26 Apr)

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pop
all 22,984 waybills

sample
the observed waybills

imag. data
possible $\bar{y}$s

amount owed

$N = 22{,}984$

\$14.15
100.02
⋮

actual SRS

amount owed

$n = 2{,}072$

mean $\bar{y}$ = \$28.09
SD s = \$31.40

\$28.09 a $\bar{y}$
28.42
⋮

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

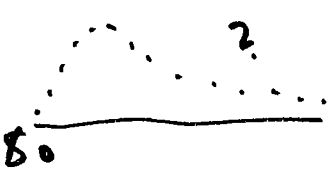
hypothetical SRS

$n = 2{,}072$

mean $\bar{y} = ?$ (ex. \$28.42)

long run mean $E(\bar{y}) = \mu$

~~(estimated)~~
long run SD $SE(\bar{y}) \doteq \$0.69$



pop. hist.

if instead sample is known & chosen randomly, we reason from sample to pop (part → whole) (inductive reasoning) ([statistical] inference) ②

here

sample SD $s = \$31.40$ is bigger than sample mean $\bar{y} = \$28.09$, & this variable can't go negative → pop. hist. has a long right hand tail (like #4 in hwk 2 on p. 47)

a good single # guess (point estimate) for μ based on sample is $\bar{y} = \$28.09$; but give or take how much?

long-run mean of $\bar{y}$s in imaginary data set = expected value of $\bar{y}$

$= EV = E(\bar{y}) = \boxed{E_{SRS}(\bar{y}) = \mu}$ (math fact)

($\bar{y}$ is an unbiased estimate of μ)

inferential summary

(unknown) quantity of interest:	μ = mean amount of money owed in population waybills
estimate:	$\bar{y} = \$28.09$
give or take:	$\hat{SE}(\bar{y}) = \$0.69$
95% CI for μ	$\bar{y} \pm 2\,\hat{SE}(\bar{y}) = (\$26.71, \$29.47)$

long-run SD of $\bar{y}$s in imaginary data set

= standard error of $\bar{y}$ = SE = $SE(\bar{y})$

$= SE_{SRS}(\bar{y}) = \,?$ $\qquad$ $SE_{IID}(\bar{y}) = \dfrac{\sigma}{\sqrt{n}}$

$$SE_{SRS}(\bar{y}) = \left[\underline{\underline{SE_{IID}(\bar{y})}} \right] \cdot \left[\sqrt{\frac{N-n}{N-1}} \right]$$

(more informative than IID)

(correction factor for SRS) (CF)

makes sense?	$n = 1 \rightarrow CF = 1$ ✓ $n = N \rightarrow CF = 0$ ✓	$n << N \rightarrow CF \doteq 1$ is a lot smaller than $SRS \doteq IID$