

this time: foundations  
 next time:  
 time:

read: J  
 ch. 1-2

(AMS ①)  
 206  
 11 Jun 18

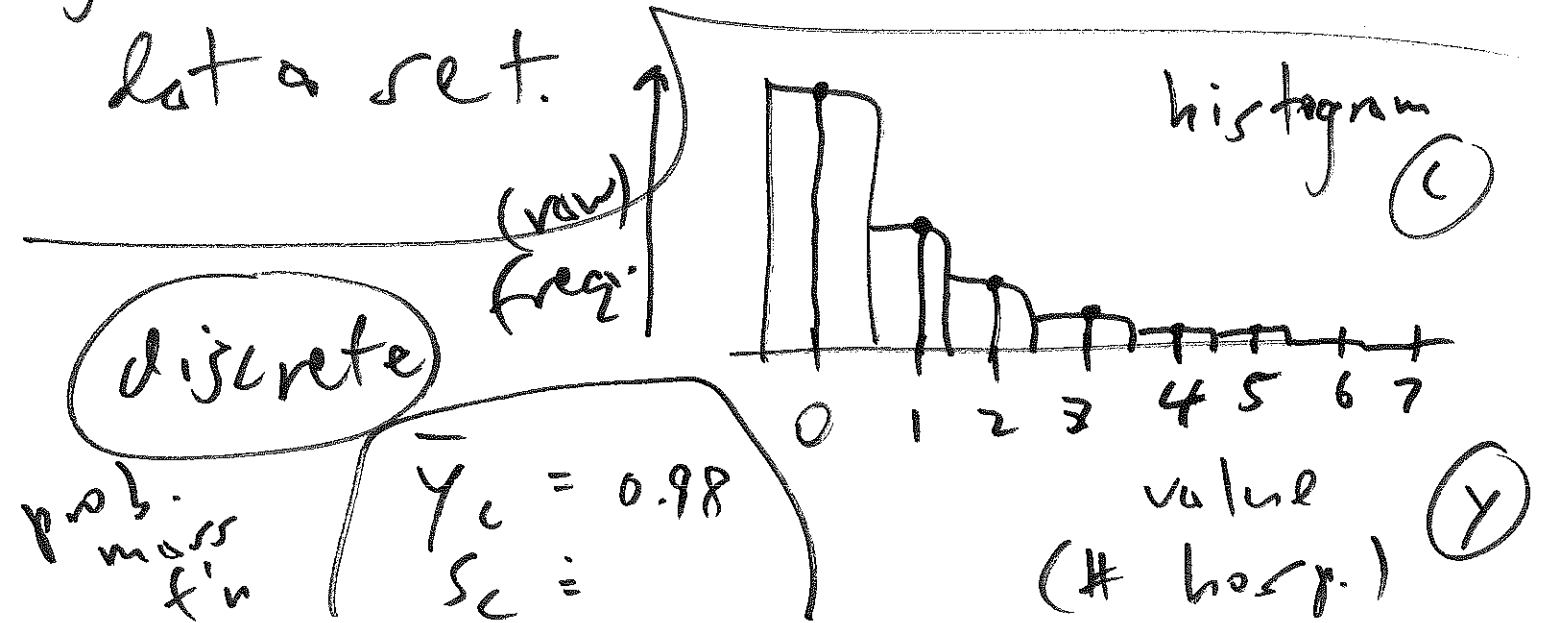
office hours

M	(DK)	5-6 pm	BE 119
Tu	(DD)	3.15-4.15 pm	BE 358?
W	(DK)	5-6 pm	BE 119
Th	(DD)	3.15-4.15 pm	BE 358!
F	(DK)	4-5 pm	BE 119

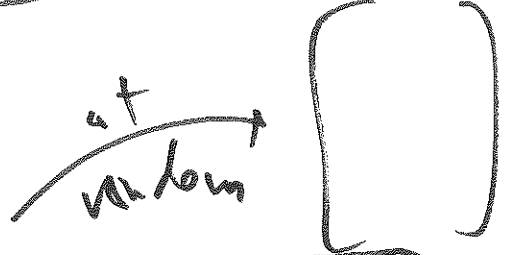
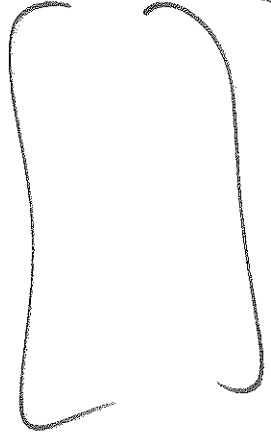
(DK) = Daniel Kirchner  
 (BE) = Bertin Engineering

4 statistical activities

① Description: numerical & graphical summaries of your data set.

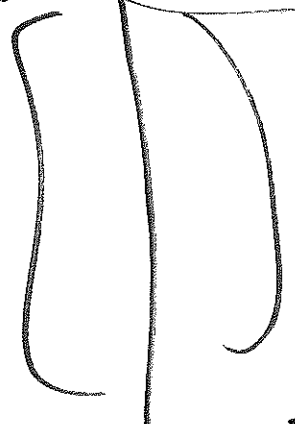


pop  
whole  
general  
known  
deduction  
sample  
part  
particular  
unknown

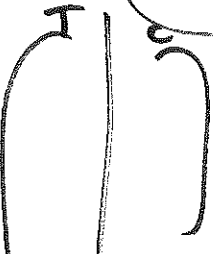


this is probabilistic reasoning

pop  
whole  
general  
unknown



induction  
sample  
part  
particular  
known



$\bar{y}$  is an estimate of  $\mu_T$

at random

$\bar{y} = 0.79$   
 $\mu_T = 0.98$   
this is statistical reasoning

$\mu_T = ?$   $\mu_c = ?$

$\bar{y}_c$  is a good est. of  $\mu_c$

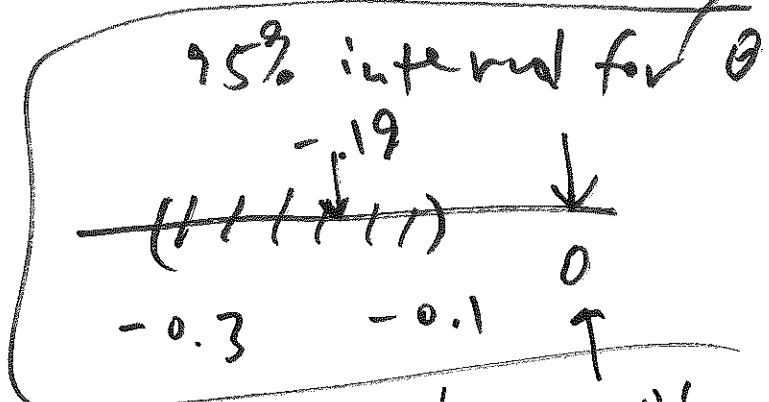
(statistical) inference

② inference: estimation of pop. ③

parameter (unknown pop. quantity)  
from sample data; attaching give-  
er-takes to estimator (freq. standard error)

(Bayesian: posterior); interval along number line  $\mathbb{R}$  in which is some sense the pop. parameter is likely to be found;

$$\theta = \frac{\mu_T - \mu_C}{\mu_C} = ?$$



since 0 is   
devils advocate position

not in the 95% interval, ~~the~~  
the difference between  $-0.19$  &  $0$   
is statistically significant (stat sig)

③ prediction of new data values ④  
from your existing data set —  
this is like inference except  
that the quantity to be ~~be~~  
predicted is new data observable, whereas  
in inference the pop. parameters  
are almost always unobservable.

④ (Economics + statistics) decision-making  
under uncertainty  
— this uses <sup>science</sup> ~~science~~ to make choices

science: acquisition of knowledge  
for its own sake

Kolmogorov:

$$P(A) = P(A' | \Omega) \quad (5)$$

$\Omega$  ← set

P.T. E.T.  
Cox - Jaynes

$$P_{CJ}(A | B)$$

↑  
T/F propositions

context ↓

big picture

problem

$$P = (Q, C)$$

↑ question(Q)    ↑ context

(pre-math)  
natural language

$$P = (Q, C)$$

question(Q)    context

unknown

$$(\theta, J, B)$$

data set

{ $B_1, \dots, B_6$ }  
all true  
by context

math