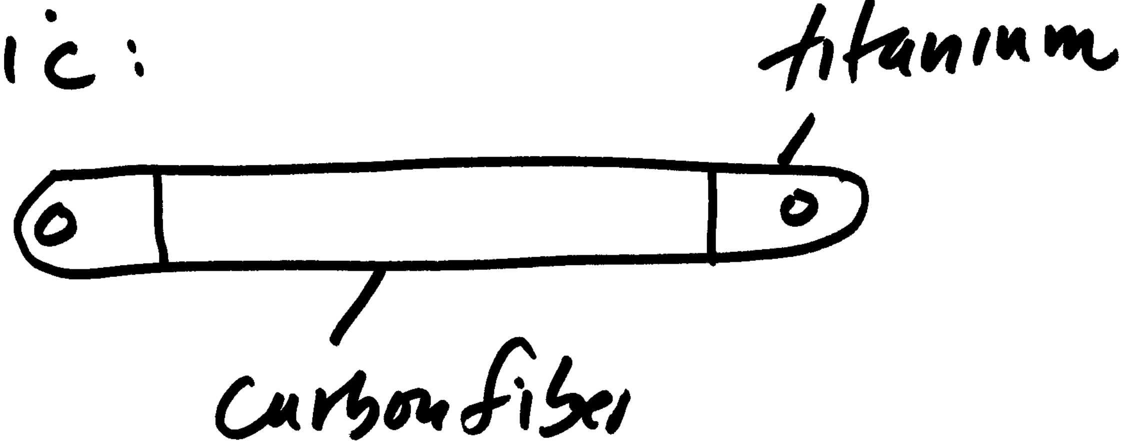
CE 597
Adj. of Geospa. Obs.
Introduction

Errors
- random
- systematic
- gross (blunders)

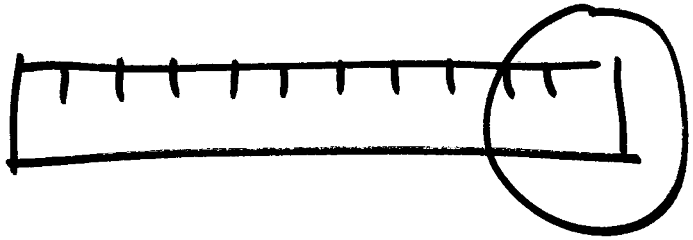
random variation

systematic:

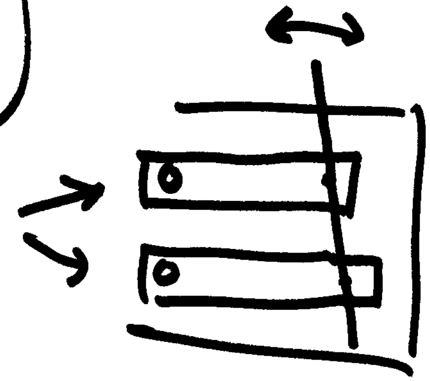
SPOT



design to compensate for thermal expansion

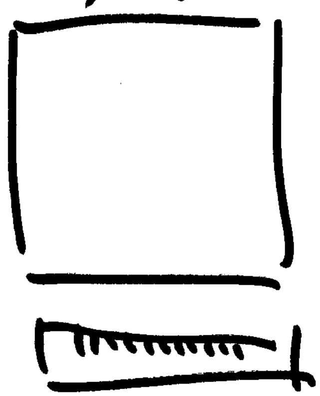


different metals



distance rod compensates for thermal expansion

early photogrammetry



glass plate

glass scale

another compensation for thermal effects gross error (blunders)

IRLS, L1-norm minimization

data snooping, ...

all these techniques require
<u>redundancy</u>

<u>assume</u>: all data has only
random variation

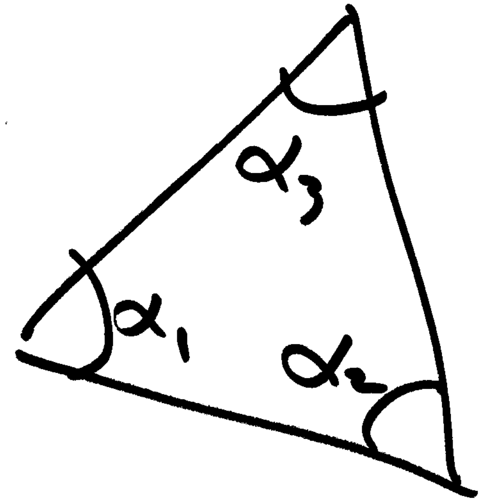
measurements

- explicitly measure quantity of interest
- related mathematically to quantity of interest

math model - physical model
  geometric description
  math model

plane triangle

(shape)



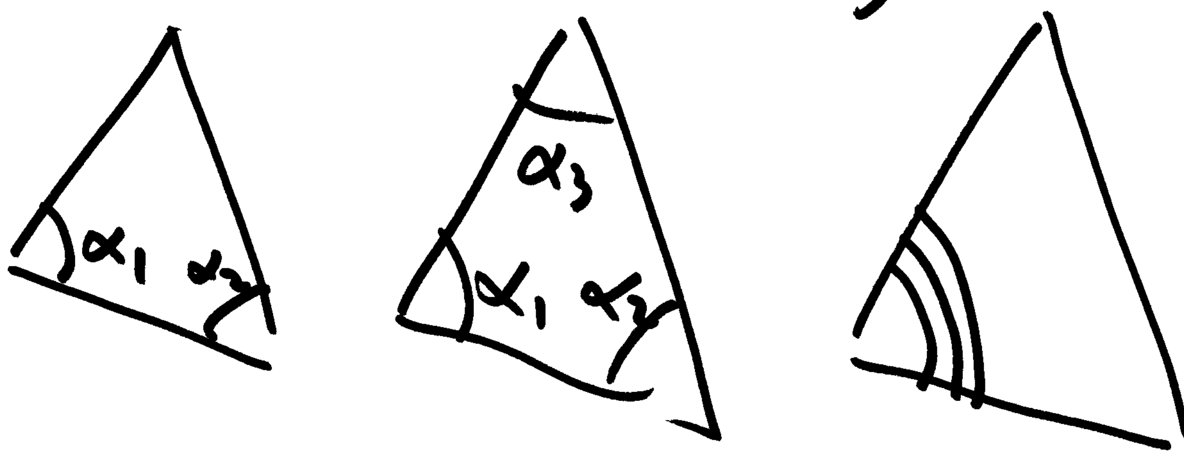
$$\hat{\alpha}_1 + \hat{\alpha}_2 + \hat{\alpha}_3 = 180^\circ$$

elements of math model

n: # of observations

n_0: minimum # of observations to fix model

$$n = 3$$
$$n_0 = 2$$
$$\overline{}$$
$$r = \underline{1} \quad \text{redundancy}$$

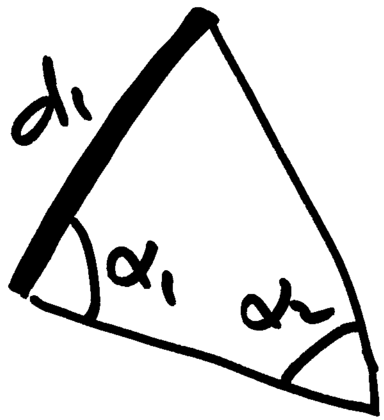


$n = 3$
$n_0 = 2$

$r = 1$

observations must fix the model before you can claim to have redundancy

in statistics, redundancy is called "degrees of freedom"



<u>size</u> + <u>shape</u>

$n_0 = 3$

<u>mathematical model</u>

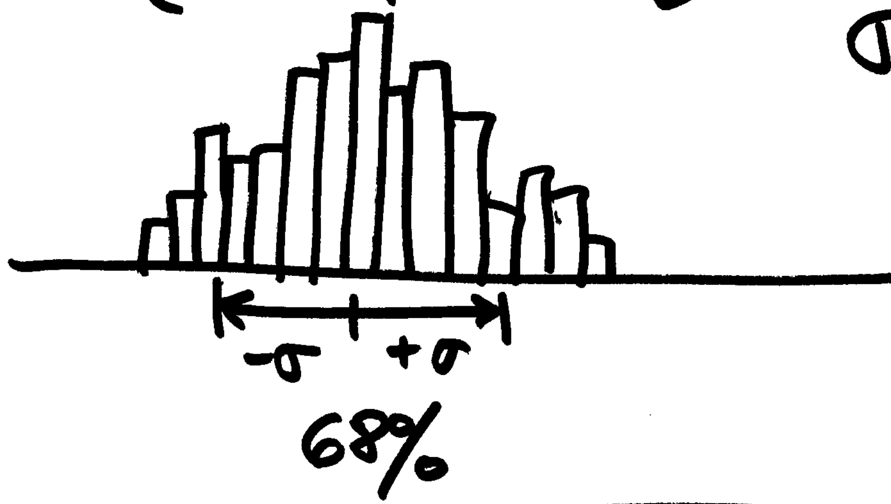
- functional model
- stochastic model

  (variability of observations)

  σ, σ^2

make multiple observations
(independent)

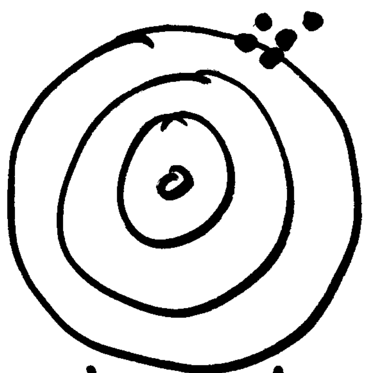
σ, σ^2



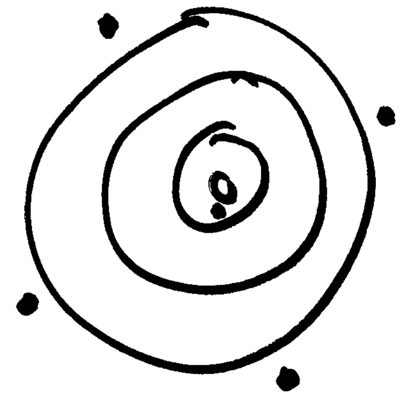
← determine σ for an instrument or observer

weight: $\boxed{w \sim \frac{1}{\sigma^2}}$

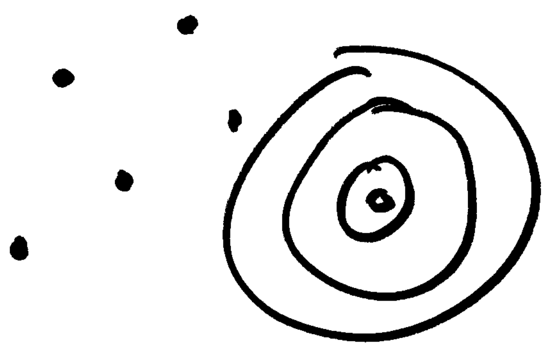
accuracy vs. precision



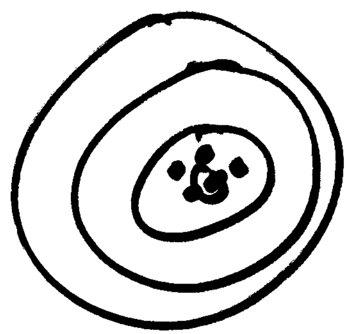
precise, not accurate



not precise, accurate



not precise
not accurate



precise +
accurate