CI Homework Hints

Data represents particle size.
Trying to filter out the small particles

If CI is not given, engineers often start by using 95%

P1 & 2

use "average" function
use "stdev" function
get t value for a 95% CI

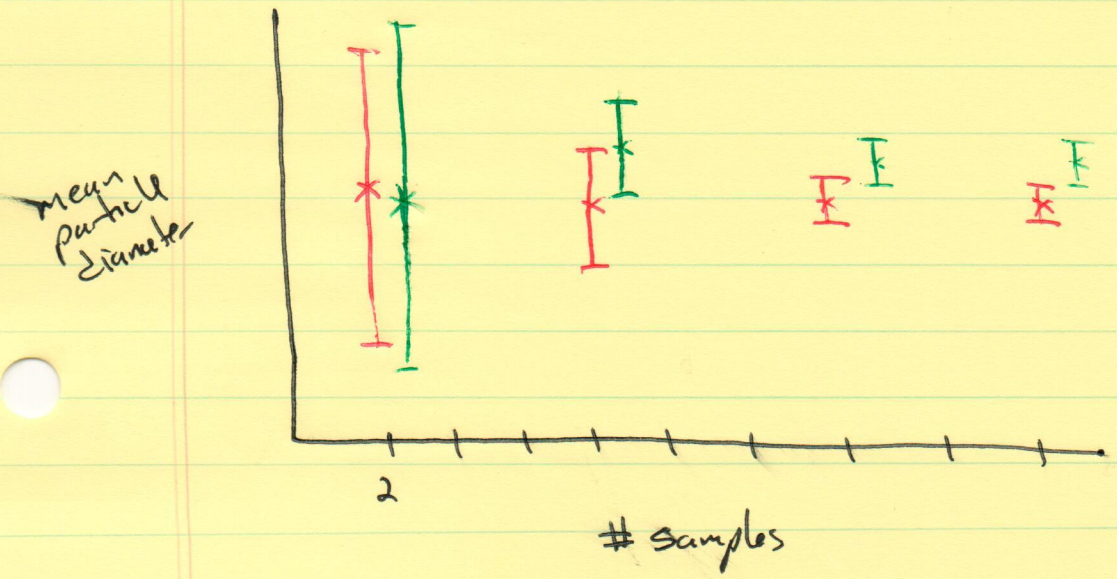
Find tolerance on true mean

$$Pr\left\{ \bar{y} - t_{(\alpha,\nu)} \frac{S}{\sqrt{N}} < \mu < \bar{y} + t_{(\alpha,\nu)} \frac{S}{\sqrt{N}} \right\} = 0.95$$

where $S \equiv$ Δ sample standard deviation

tolerance $= \pm t_{(\alpha,\nu)} \frac{S}{\sqrt{N}}$

Excel plots (x-y scatter)
y error bars → custom (use the ± tolerance values)



P3

a) come up with a quantitative way to answer this question.

b) too close to tell from plot alone. Look at the upper + lower bounds between two methods to see if there is any overlap.

P4

$$Pr\left\{\bar{y}_1 - \bar{y}_2 - t(\alpha,\nu) S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} < \mu_1 - \mu_2 < \bar{y}_1 - \bar{y}_2 + \ldots.\right\} = 0.95$$

The data, mean, stdev are the same

D.O.F is different

$t(\alpha, \nu)$ D.O.F.

What about bad data?

Point 6 from Method A could be an outlier. How do you know to keep or not?

- Look @ data vs. true mean tolerance
- Look @ data vs. 95% CI

P6

You need to define "better", and quantify it

P7

- use random # generator.

  rand() · (b − a) + a

  a = lower limit
  b = upper limit

  } How to choose?

  - If stdev is your final bound, choose 2 for 95%, 3 for 99%, etc.
  - If using t values, use 1 stdev.

  ex equipment = ± 0.1 volt @ 95%
  s = ± 0.05 @ 68%

  a = 12 − 0.05 − 0.03
  b = 12 + 0.05 + 0.03

  } single stdev.

- Find mean → should eventually be ~ 12 V
- Find stdev → " " ~ 0.05
- Find how much data before you get to a tolerance of 0.03 or less $t_{(\alpha,\nu)} \frac{s}{\sqrt{N}} < 0.03$

Note

- Fake data isn't reliable data.
- In Excel, rand() updates every time you hit Enter
- may want to create fake data, then use the "paste values" to keep consistent