M E 345

Today, we will:

- Do some review example problems predicting the mean using the *t* PDF
- Finish reviewing the pdf module: Other PDFs the Chi-squared PDF
- Do an example problem chi-squared PDF

Example: Estimating the population mean

Given: Five measurements are made of the force required to break an expensive component (too costly to do more):

312.2, 320.6, 315.5, 314.1, and 319.6 lbf

The sample mean and sample standard deviation of these data are 316.4 and 3.592 lbf.

(*a*) To do: Estimate the population mean and its confidence interval for 95% confidence level. [See also Excel and Matlab solutions for this problem on the course website.] Solution:

(*b*) To do: If we were to repeat for 98% confidence level, would the confidence interval be narrower, the same, or wider than the confidence interval for 95% confidence level? Solution:

(c) To do: Estimate how many measurements would need to be taken to reduce the confidence interval to ± 2.0 lbf [while maintaining a 95% confidence level].

Solution:

Example: Estimating population mean and standard deviation

Given: A quality control engineer pulls 10 resistors at random from an assembly line that makes $10-k\Omega$ resistors, and measures each resistance. The measurements are given here:

Measurement number	Resistance, k Ω	
1	10.10	sample mean $= 10.087 kO$
2	10.08	sample standard deviation = $0.02312 \text{ k}\Omega$
3	10.11	
4	10.09	
5	10.07	
6	10.05	
7	10.12	
8	10.11	
9	10.08	
10	10.06	

(*a*) To do: Estimate the population mean and its confidence interval for 95% confidence level.

(*b*) To do: Estimate the population standard deviation and its confidence interval for 95% confidence level.

(c) To do: The company guidelines specify that the population standard deviation be less than 0.35% of the mean to 98% confidence. Estimate how many *additional* resistors the quality control engineer needs to pull off the assembly line to measure.

Solution: