Notes on Estimation Theory

(15.05.20)

In constructing a confidence interval for the mean of the population we have to consider three factors:

1. Whether the population from which the sample is chosen is normally distributed or not.
2. Whether the standard deviation σ of the population is given or not.
3. Size of the sample.

The following table gives the formulas to be used (See page 6 in the script)

Interval Estimation of the population Mean

Population	Sample size	σ known	σ unknown
Normally distributed	Large $(n \geq 30)$	$\bar{x} \pm z\sigma_{\bar{x}}$	$\bar{x} \pm ts_{i}$ or $\bar{x} \pm zs_{\bar{x}}{}^{**}$
	Small $(n < 30)$	$\bar{x} \pm z\sigma_{\bar{x}}$	$\bar{x} \pm ts_{\bar{x}}$
Not normally distributed	Large $(n \geq 30)$	$\bar{x} \pm z\sigma_{\bar{x}}{}^{*}$	$\bar{x} \pm ts_{\bar{x}}{}^{*}$ or $\bar{x} \pm zs_{\bar{x}}{}^{***}$
	Small $(n < 30)$	Nonparametric procedures directed toward the median generally would be used.	

In this note we deal only with the column 3 (σ known) with the formula

$$\bar{x} \pm z\sigma_{\bar{x}}$$

Here are

$\bar{x}$: Mean of the sample

$\sigma_{\bar{x}} := \frac{\sigma}{\sqrt{n}}$: Standard deviation of the sampling distribution of the mean

z: Critical value (You find it for a given significance in the last row of the t-distribution, two-tailed)

Go please through the examples 2.2., 2.3. and 2.4. For questions end me please An e-mail.