

population mean μ

Which population parameter to estimate?

Population Variance

Population proportion p

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Population Median

Let n = sample size
 Let \bar{X} = sample mean
 Let *C.I.* be confidence level (95% etc..)

is population standard deviation σ known?

No

Yes

Regardless of sampling method?

Type of Sampling?

Sampling Without replacement
 (uses finite population correction term)

Sampling With replacement

$$s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

$$\sigma_{\bar{X}} = \frac{s}{\sqrt{n}} \sqrt{1 - \frac{n}{N}}$$

Let N = population size

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} \sqrt{1 - \left(\frac{n-1}{N-1}\right)}$$

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$$

Since sample std is used instead of population std, then use the Student t-distribution with degree of freedom = $n-1$

For given C.I., Look up $t_{\frac{\alpha}{2}}$ from Student t distribution table

$$\hat{\mu} = \bar{X}_n \pm t_{\frac{\alpha}{2}} \sigma_{\bar{X}}$$

For given C.I., Look up $z_{\frac{\alpha}{2}}$ from Z distribution table

$$\hat{\mu} = \bar{X}_n \pm z_{\frac{\alpha}{2}} \sigma_{\bar{X}}$$