

**Population variance  $\hat{\sigma}$**

Which population parameter to estimate?

Population mean

Population proportion

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Population Median

Let  $n$  = sample size

Let  $s^2$  be sample variance

Let  $\bar{X}$  be the sample mean

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

Let *C.I.* be confidence level (95% etc..)

use the Chi-square distribution with degree of freedom =  $n-1$

No

Is sample size  $n$  large?  $>30$

use the Chi-square distribution with degree of freedom =  $n$

Yes

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

$$\sigma = \pm \frac{s\sqrt{n-1}}{\chi_{(n-1),\alpha/2}^2}$$

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