

Confidence Interval about the Population Variance

Example

x	x^2
5.02	25.2
5.00	25
5.05	25.503
4.98	24.8
4.99	24.9
5.06	25.604
4.96	24.602
5.04	25.402
4.97	24.701
5.03	25.301
Σx	Σx^2
50.1	251.012

$$s^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}$$

$$= \frac{251.012 - \frac{50.1^2}{10}}{9}$$

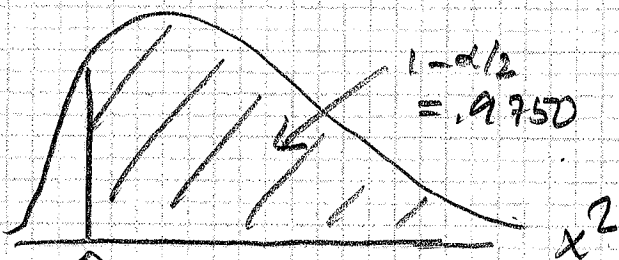
$$= .0012$$

95% CI for σ^2 $df = n-1 = 9$

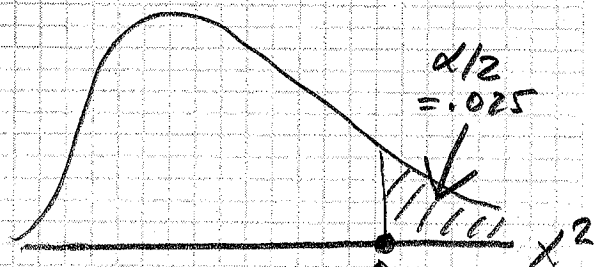
$$\left(\frac{(n-1)s^2}{\chi^2_{\alpha/2}}, \frac{(n-1)s^2}{\chi^2_{1-\alpha/2}} \right)$$

$$\alpha = 1 - .95 = .05 \Rightarrow \frac{\alpha}{2} = .025$$

$$1 - \frac{\alpha}{2} = 1 - .025 = .9750$$



\uparrow
 $\chi^2_{1-\alpha/2}$
 $\chi^2_{.9750}$
 2.7039



\downarrow
 $\chi^2_{\alpha/2}$
 $\chi^2_{.025}$
 19.0228

$$95\% \text{ CI} = \left(\frac{9 * .0012}{19.0228}, \frac{9 * .0012}{2.7039} \right)$$

$$= (.000568, .004000)$$