ZA 16.3

Ladekapazität normalverteilt mit $\sigma = 1{,}1456$.

(a) X: Ladekapazität in Ah

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = \frac{1}{46}\left(10\cdot 72 + 7\cdot 73 + 13\cdot 74 + 16\cdot 75\right)$$

$$= \frac{3393}{46} = 73{,}761 \text{ Ah}$$

$\bar{x} = 73{,}761$ Ah

(b) 95 % Konfidenzintervall für Mittelwert μ

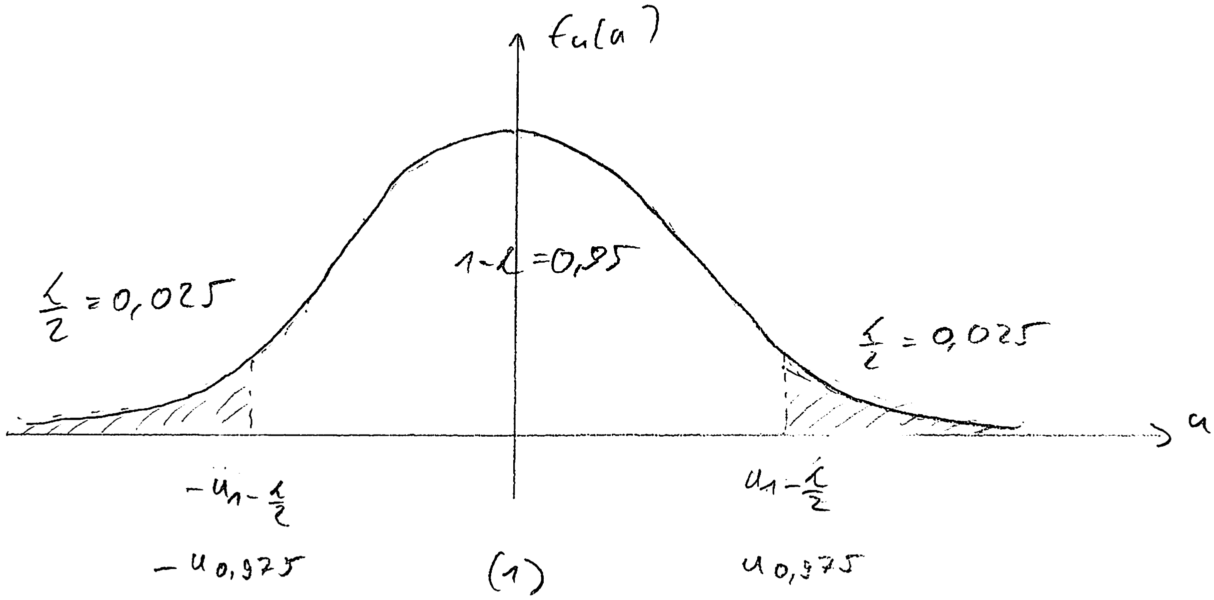
$[\hat{\Theta}_u(\alpha), \hat{\Theta}_o(\alpha)]$ heißt Konfidenzschätzer zum

Konfidenzniveau $1-\alpha$ wenn gilt:

$$P\left(\hat{\Theta}_u(\alpha) \le \vartheta \le \hat{\Theta}_o(\alpha)\right) = 1-\alpha$$

$$P\left(\hat{\Theta}_u(0{,}05) \le \mu_K \le \hat{\Theta}_o(0{,}05)\right) = 95\,\%$$

$\alpha = 0{,}05$, $1-\alpha = 0{,}95$



ZA 16.3

$$P(-u_{1-\frac{\alpha}{2}} \leq U \leq u_{1-\frac{\alpha}{2}}) = 1-\alpha$$

$$\Leftrightarrow \quad P(-u_{0,975} \leq u \leq u_{0,975}) = 0,95$$

$\downarrow$ Tabelle

$$u_{0,975} = 1,97$$

Transformation: $u = \dfrac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

$$\Leftrightarrow \quad P\left(-u_{1-\frac{\alpha}{2}} \leq \frac{\bar{x}-\mu}{\sigma/\sqrt{n}} \leq u_{1-\frac{\alpha}{2}}\right) = 1-\alpha$$

$$\Leftrightarrow \quad P\left(-\bar{x} - u_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} \leq -\mu \leq -\bar{x} + u_{1-\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}\right) = 1-\alpha$$

$$\Leftrightarrow \quad P\left(\bar{x} - \mu_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{x} + u_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}\right) = 1-\alpha$$

Konfidenzintervall: $\left[\bar{x} - u_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} ; \bar{x} + u_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}\right]$

$\bar{x} = 73,761$ AG

$u_{1-\frac{\alpha}{2}} = 1,97$

$n = 46$

$\sigma = 1,1456$ $\quad \Rightarrow \quad [73,428 ; 74,094]$

c) $a = u_{1-\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}} \Leftrightarrow n = \left(u_{1-\frac{\alpha}{2}} \cdot \frac{\sigma}{a}\right)^2$

$a = 1$ AG

$u_{1-\frac{\alpha}{2}} = 1,97$

$\sigma = 1,1456$ $\quad \Rightarrow \quad n = 5$