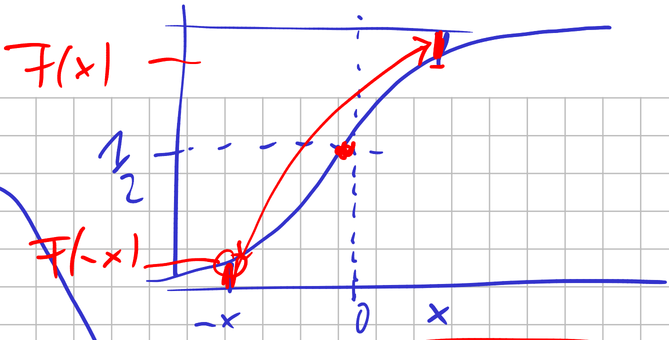
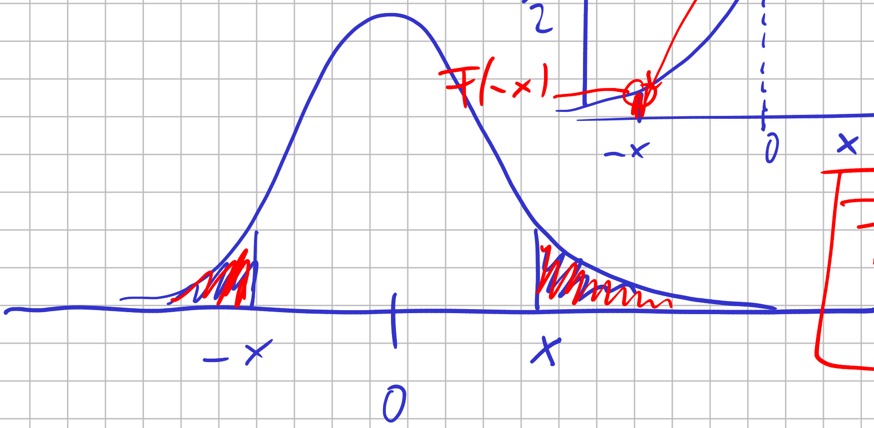
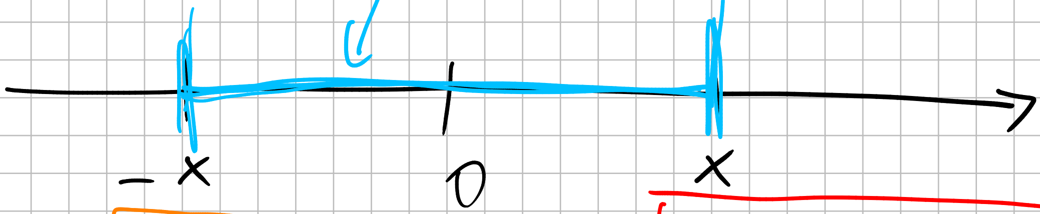




$$\boxed{F(-x) = 1 - F(x)}$$

$$\mathbb{P}\left(\left|\frac{\overline{X}_n - \mu_0}{\sigma_0/\sqrt{n}}\right| \le x\right) = 2\Phi(x) - 1$$

1-

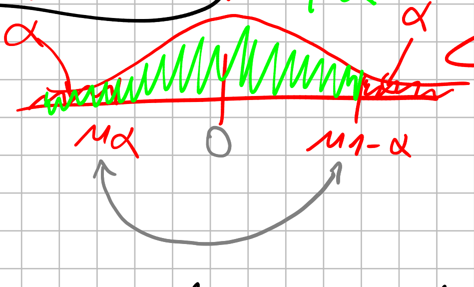


$$\mathbb{P}\left(\left|\frac{\overline{X}_n - \mu_0}{\sigma_0/\sqrt{n}}\right| \ge x\right) = \boxed{2(1-\Phi(x)) = \underbrace{\alpha}_{\text{klein}}}$$

$$\boxed{-u_{1-\alpha} = u_\alpha}$$

$$\iff 1 - \frac{\alpha}{2} = \Phi(x)$$

$$\iff x = \Phi^{-1}\left(1 - \frac{\alpha}{2}\right) =: u_{1-\alpha/2}$$



$$u_{1-\alpha} = -u_\alpha$$

$$\frac{|\bar{X}_n - \mu_0|}{\sigma_0/\sqrt{n}} \geq u_{1-\alpha/2} = \Phi^{-1}\left(1-\frac{\alpha}{2}\right)$$

$$\Phi\left(\frac{|\bar{X}_n - \mu_0|}{\sigma_0/\sqrt{n}}\right) \geq 1-\alpha/2$$

p-Wert: $\alpha = 2\left(1 - \Phi\left(\dots\right)\right)$

$$\boxed{X_1^{(m)}, \dots, X_n^{(m)} \overset{u.i.v.}{\sim} Q\ ?}$$

mit $\mathbb{E}[X_i] = \mu$, $i = 1, \dots, n$

$\mathrm{Var}(X_i) = \sigma^2$,

$$\Rightarrow \mathbb{E}[\bar{X}_n] = \mu$$

$$\& \left[\mathrm{Var}(\bar{X}_n) = \frac{\sigma^2}{n}\right]$$

$$\boxed{\bar{X}_n^{(1)}, \dots, \bar{X}_n^{(M)}}$$

$$\sqrt{n}\,\frac{\bar{X}_n - \mu}{\sigma} \sim \mathcal{N}(0,1)$$

$$\Rightarrow \mathbb{P}\left(\left|\sqrt{n}\,\frac{\bar{X}_n - \mu}{\sigma}\right| \leq u_{1-\alpha/2}\right) = 1-\alpha$$

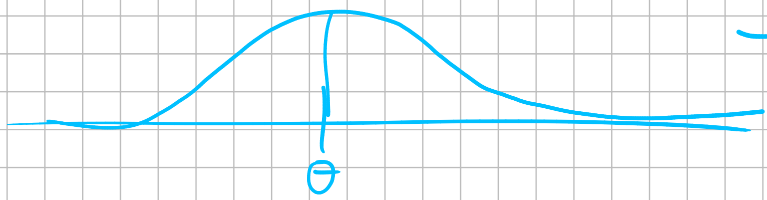
$$\Leftrightarrow \mathbb{P}\left(-u_{1-\alpha/2} \leq \sqrt{n}\,\frac{\bar{X}_n - \mu}{\sigma} \leq u_{1-\alpha/2}\right)$$

$$\underline{\bar{X}_n - u_{1-\alpha/2}\frac{\sigma}{\sqrt{n}}} \leq \mu \leq \underline{\bar{X}_n + u_{1-\alpha/2}\frac{\sigma}{\sqrt{n}}}$$

$$X \sim F \qquad F' = f$$

$$\mu = \mathbb{E}[X] = \int_{-\infty}^{\infty} x \cdot \underbrace{f(x)}\, dx \qquad , \quad \mathbb{E}[|X|] < \infty$$

$$\int_{-\infty}^{\infty} |x| \cdot f(x)\, dx < \infty$$



$$X_1, \dots, X_n \overset{iid}{\sim} \mathcal{N}(\mu, \sigma^2)$$

$$\bar{X}_n \sim \mathcal{N}(\mu, \sigma^2/\cancel{\sqrt{n}})$$

$$\frac{\bar{X}_n - \mu}{\sigma/\sqrt{n}} \sim \mathcal{N}(0,1)$$

$$\frac{\bar{X}_n - \mu}{\sqrt{\hat{\sigma}_n^2/n}} = \frac{\bar{X}_n - \mu}{\sqrt{\sigma^2/n}} \cdot \sqrt{\frac{\sigma^2}{\hat{\sigma}^2}} = \frac{\underbrace{(\bar{X}_n - \mu)/\sqrt{\sigma^2/n}}_{\sim \mathcal{N}(0,1)}}{\sqrt{\underbrace{\hat{\sigma}^2/\sigma^2}_{\sim \frac{1}{n-1}\chi^2_{n-1}}}}$$

$$\frac{(n-1)\hat{\sigma}_n^2}{\sigma^2} \sim \chi^2_{n-1}$$

$$\frac{(n-1)\hat{\sigma}_n^2}{\sigma^2} = \frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{\sigma^2} = (X_1, \dots, X_n)\, P \begin{pmatrix} X_1 \\ \vdots \\ X_n \end{pmatrix} \qquad \mathcal{N}_n(\mu, \boxed{\sigma^2 I_n})$$

$$\sim \chi^2_{\mathrm{Rg}(P)}$$

$$\& \quad \hat{\sigma}_n^2 \perp_{\mathbb{P}} \bar{X}_n$$

$$\sim \frac{\mathcal{N}(0,1)}{\sqrt{\chi^2/(n-1)}} = t_{n-1}$$

$\hat{\sigma}_n^2$, S_n^2 : SP$_n$-Varianz

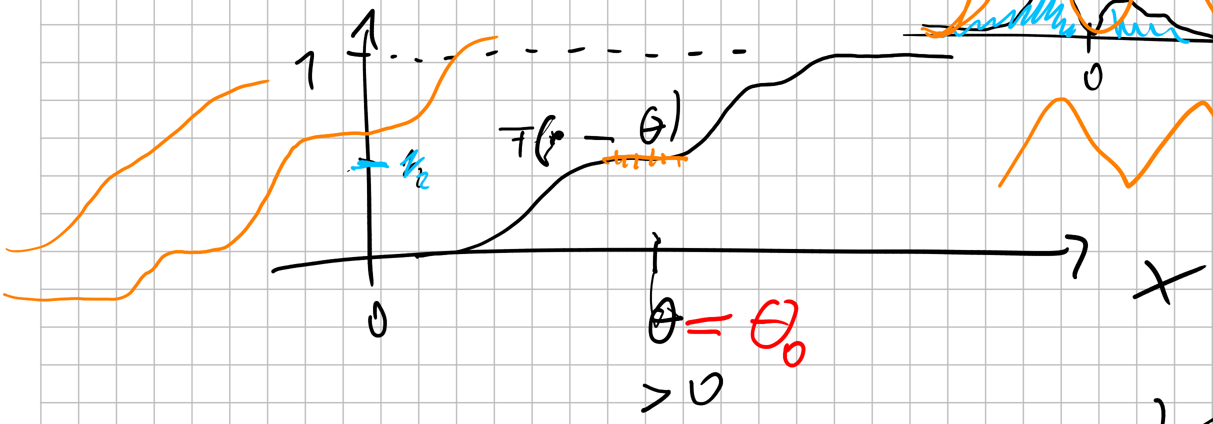
$\hat{\sigma}_n$, S_n : SP$_n$ - Std.-abw.

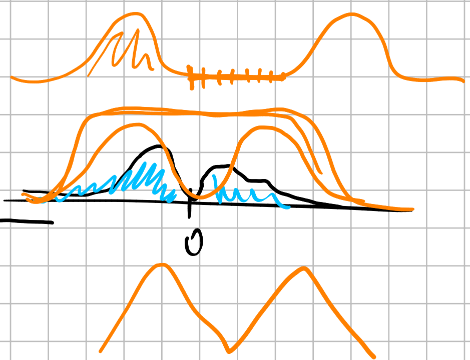
$\frac{\hat{\sigma}_n}{\sqrt{n}}$, $\frac{S_n}{\sqrt{n}}$: Std.-fehler (von $\bar{x}$)

Std. error (of the mean)

(s.e.m.)

$X \sim F(\cdot - \theta)$





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