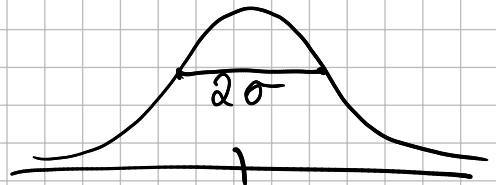


$$d_{\Delta}(x) = f(x + \Delta) - f(x)$$

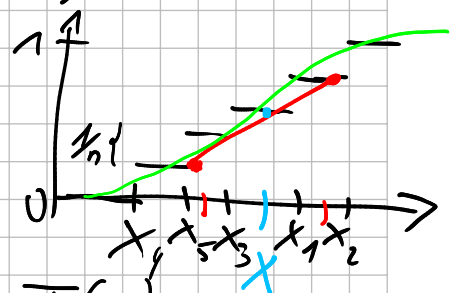
$$F(x) = P(X \leq x) : X \sim F$$

$$= \int_{-\infty}^x f(u) du : f = F'$$



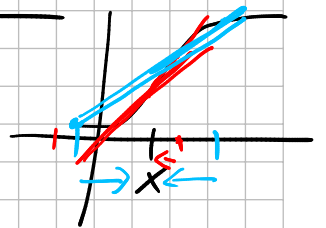
$$F_n(x) = \frac{1}{n} \sum_{i=1}^n 1_{\{X_i \leq x\}}$$

$\xrightarrow{\text{f.s.}} F(x) (n \rightarrow \infty)$



$$f(x) = F'(x) = \lim_{h \rightarrow 0} \frac{F(x+h) - F(x)}{h}$$

$$= \lim_{b \downarrow 0} \frac{F(x+b) - F(x-b)}{2b}$$



$$\hat{f}_n(x) := \frac{F_n(x+b_n) - F_n(x-b_n)}{2b_n}$$

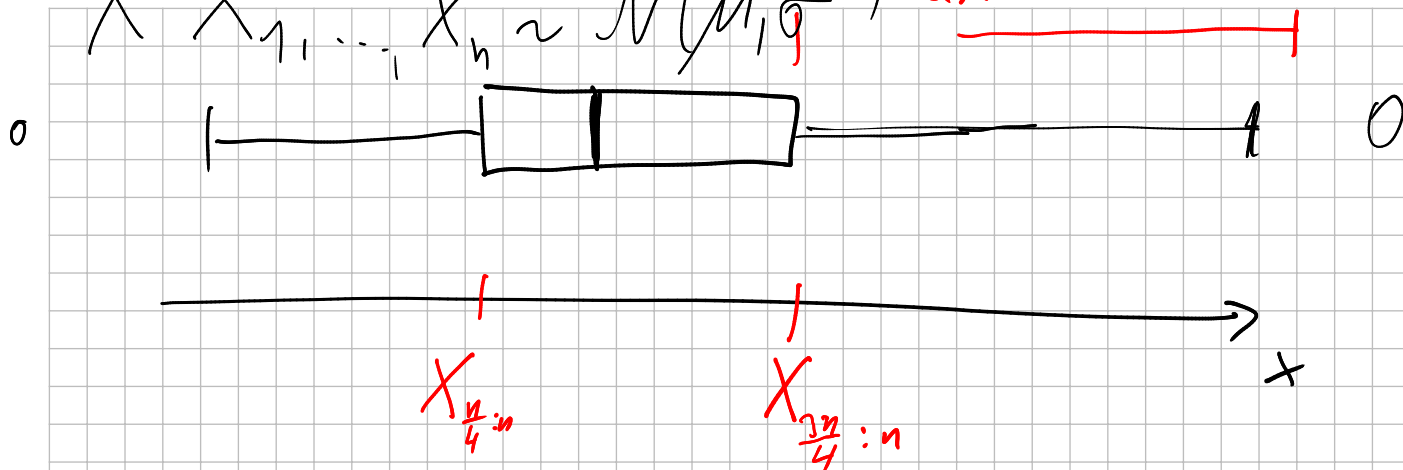
$\xrightarrow{\text{f.s.}} f(x), n \rightarrow \infty \text{ \& } b_n \rightarrow 0 \text{ \& } n \cdot b_n \rightarrow \infty$

(1, ..., 1)

(1, ..., 1)

001 x 11
n x h

$$X, X_1, \dots, X_n \sim N(\mu, \sigma^2) \quad QA$$



$$X_{\frac{3n}{4}:n} + \frac{3}{2} \cdot QA \approx \mu + 2.7 \cdot \sigma$$

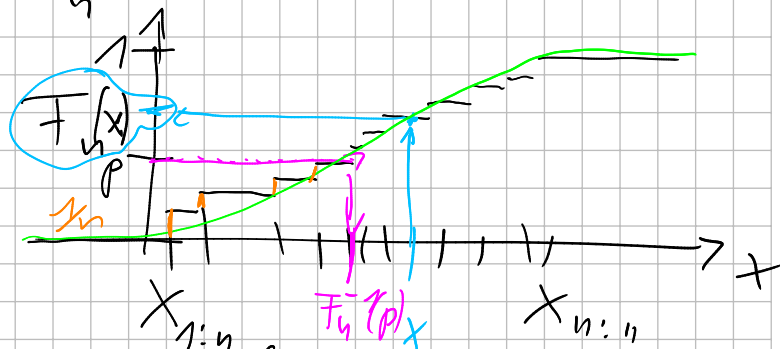
$$X_{\frac{n}{4}:n} - \frac{3}{2} \cdot QA \approx \mu - 2.7 \cdot \sigma$$

$$= \mathbb{P}(X > \mu + 2.7\sigma \text{ oder } X < \mu - 2.7\sigma)$$

$$= \mathbb{P}(|X - \mu| > 2.7\sigma)$$

$$\approx 0.007$$

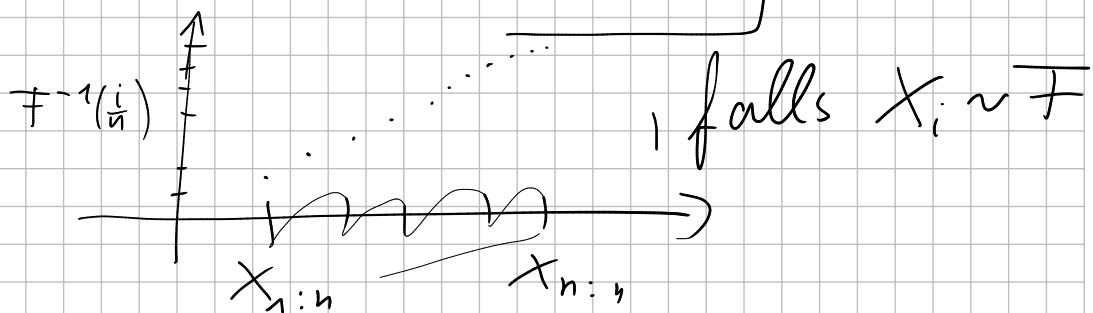
$$X_1, \dots, X_n \sim F$$



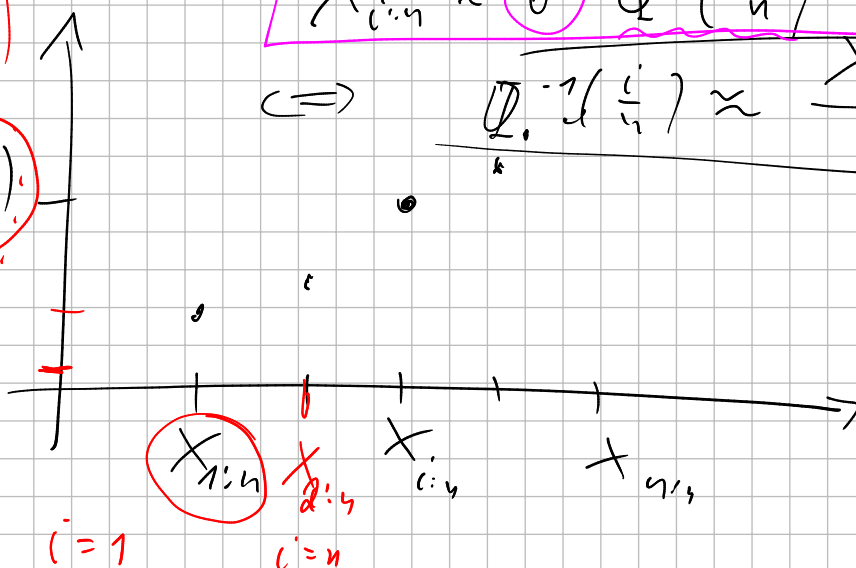
$$\sup_{x \in \mathbb{R}} |F_n(x) - F(x)| \xrightarrow{\text{f.s.}} 0, n \rightarrow \infty$$

$$F_n^{-1}(p) \xrightarrow{\text{f.s.}} F^{-1}(p), n \rightarrow \infty, F^{-1} \text{ stetig in } p$$

$$X_{i:n} = F_n^{-1}\left(\frac{i}{n}\right) \approx F^{-1}\left(\frac{i}{n}\right)$$



$$\Phi^{-1}\left(\frac{i}{n}\right)$$



$$X_{i:n} \approx \sigma \cdot \Phi^{-1}\left(\frac{i}{n}\right) + \mu$$

$$\Rightarrow \Phi^{-1}\left(\frac{i}{n}\right) \approx \frac{X_{i:n} - \mu}{\sigma} = \frac{1}{\sigma} \sum_{j=1}^n X_j$$

Power

