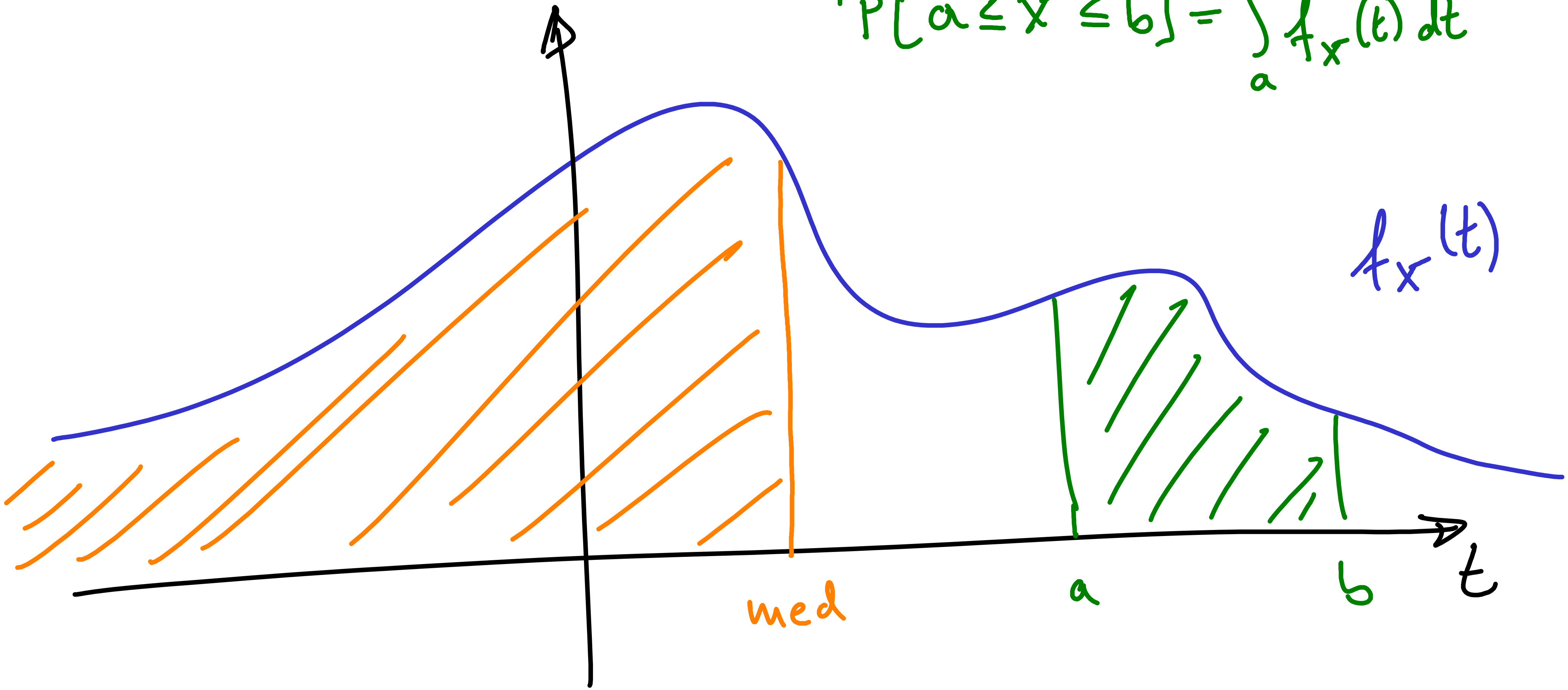
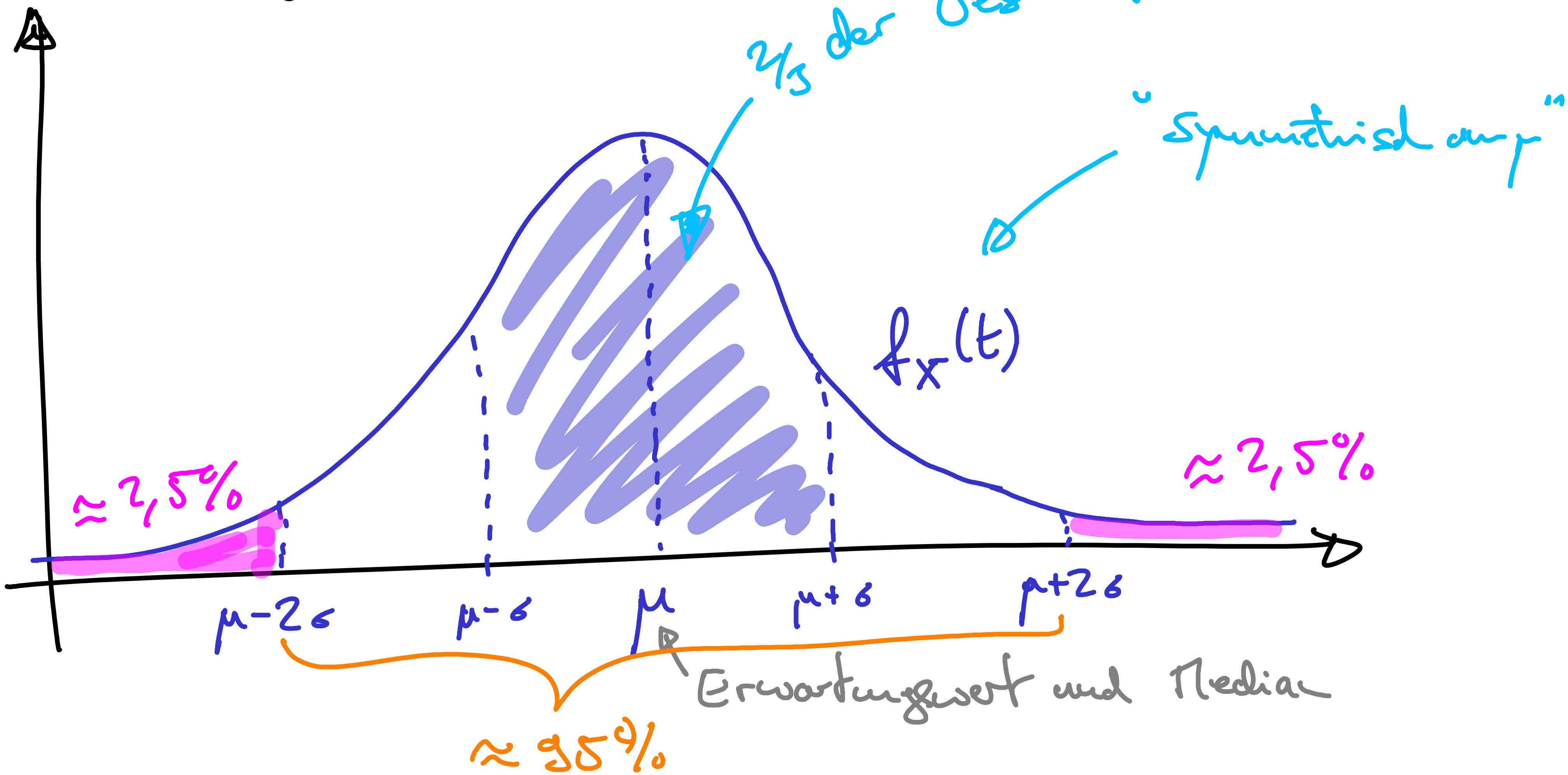
$$P[a \le X \le b] = \int_a^b f_X(t)\,dt$$

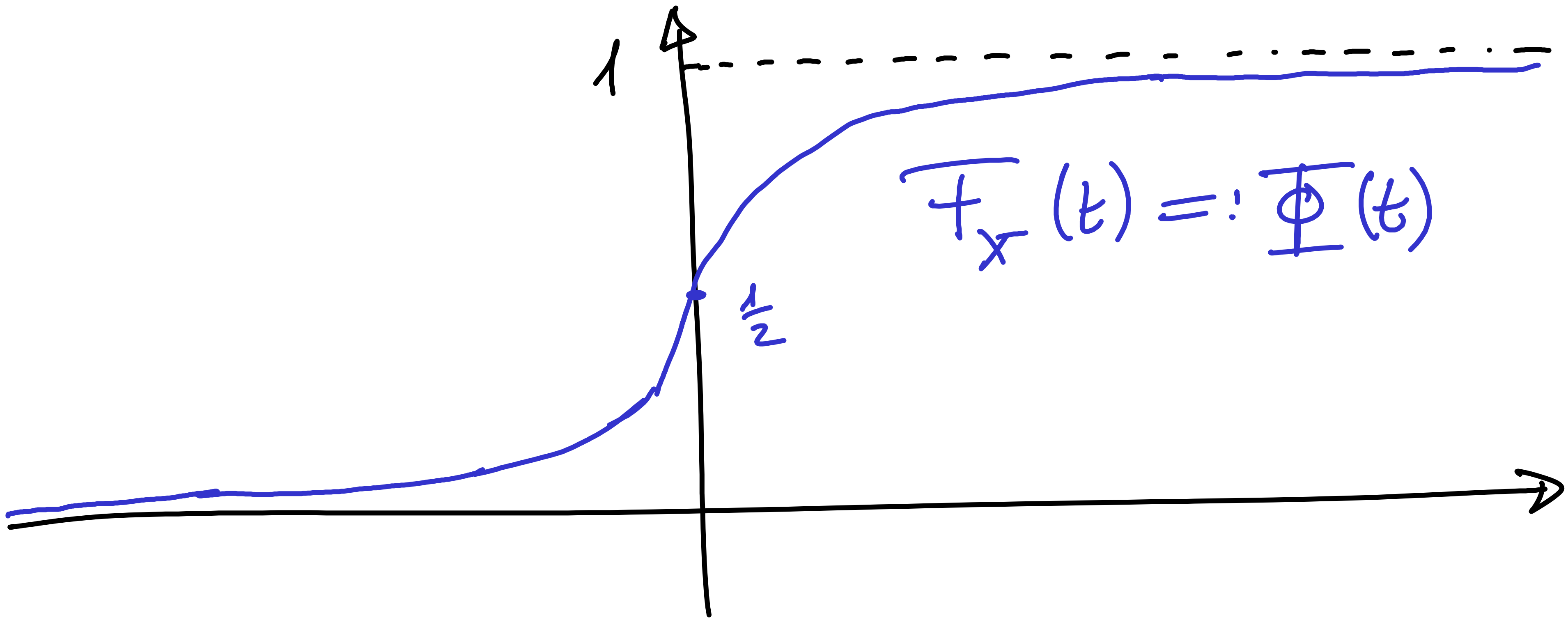


$$\underbrace{P[X \le \mathrm{med}]}_{= \int_{-\infty}^{\mathrm{med}} f_X(t)\,dt \;=\; F_X(\mathrm{med})} \overset{!}{=} \frac{1}{2}$$

Normalverteilung



Normalverteilung, $X \sim N(0,1)$



$$X \sim \mathcal{N}(\underset{\mu}{2}, \underset{\sigma^2}{5}) \quad , \quad P[X \geq 7] = ?$$

$$Z := \frac{X-2}{\sqrt{5}} \sim \mathcal{N}(0,1)$$

$$P[X \geq 7] = P[X-2 \geq 5] = P\left[\frac{X-2}{\sqrt{5}} \geq \frac{5}{\sqrt{5}}\right]$$

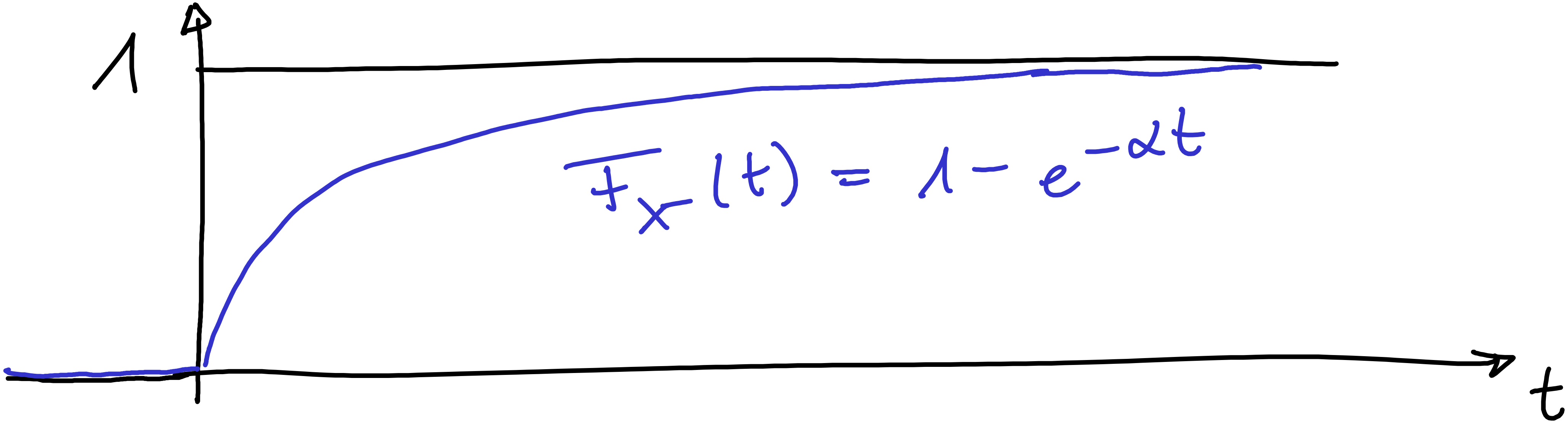
$$= P[Z \geq \sqrt{5}] = 1 - P[Z < \sqrt{5}]$$

$$= 1 - \Phi(\sqrt{5}) = 1 - \text{normcdf}(\text{sqrt}(5))$$

$$\approx 1{,}3\,\%$$

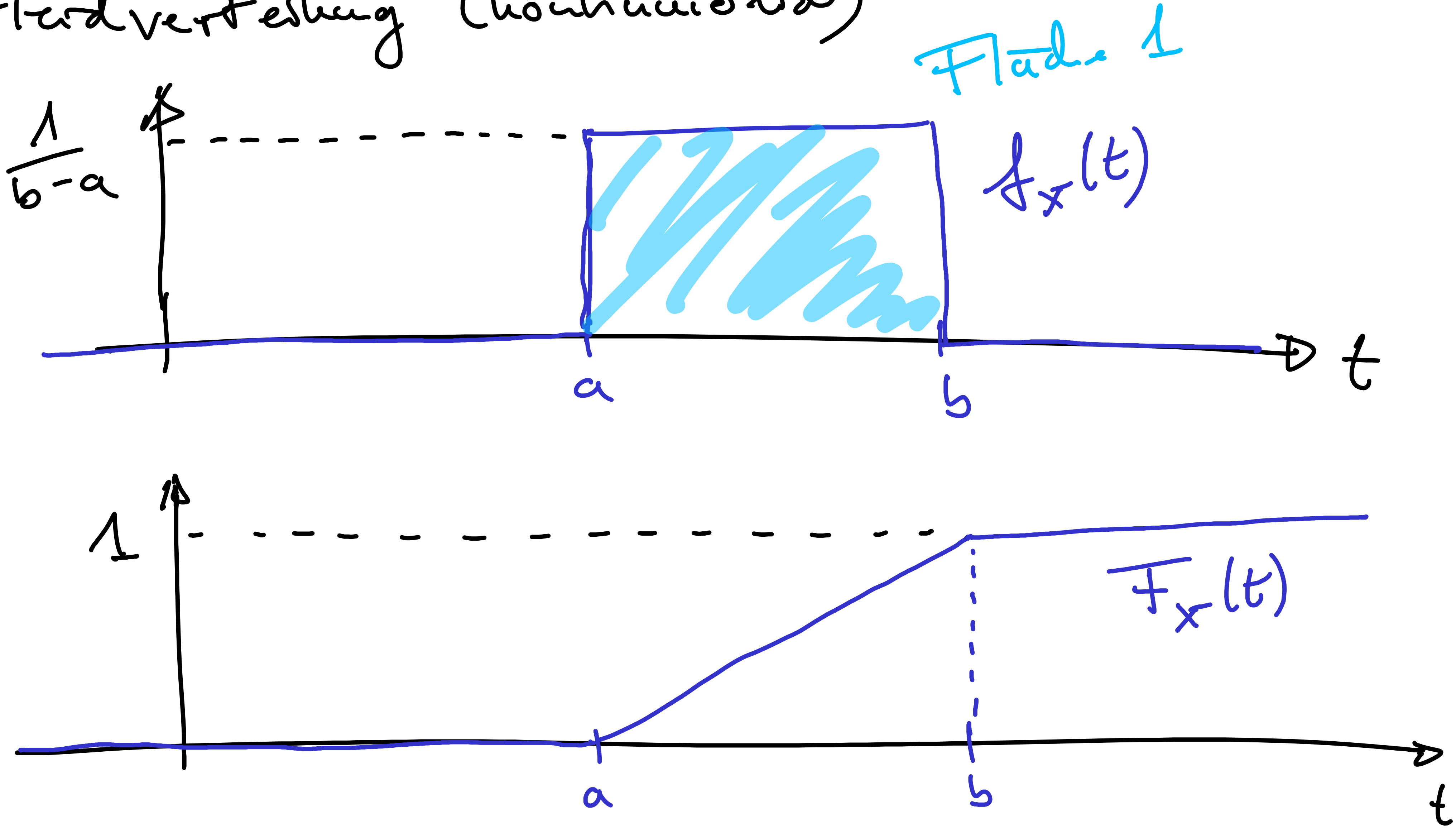
Exponentialverteilung

$$f_X(t) = \alpha e^{-\alpha t}$$



$$F_X(t) = 1 - e^{-\alpha t}$$

Gleichverteilung (kontinuierlich)



Bsp. zum ZGS

z.Z.: $\mathrm{Bin}(n,p) \approx \mathcal{N}(np, np(1-p))$, $n \to \infty$

$$X_1, X_2, \ldots, X_n \sim \mathrm{Bin}(1,p)$$

immer, exakt

$$Y := X_1 + X_2 + \ldots + X_n \sim \mathrm{Bin}(n,p)$$

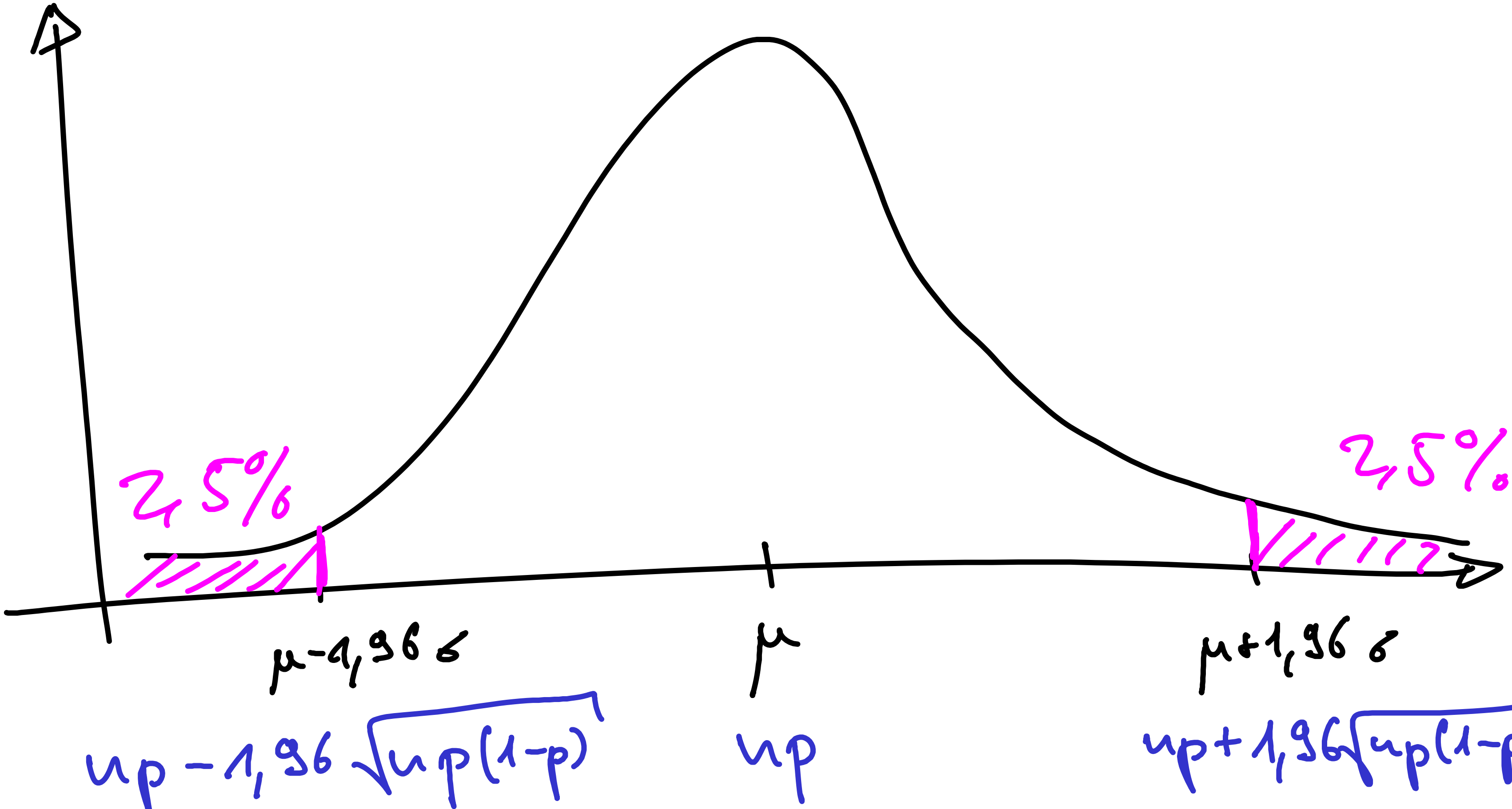
$$E[Y] = np, \quad \mathrm{Var}(Y) = np(1-p)$$

$$Y = X_1 + X_2 + \ldots + X_n \sim \mathcal{N}(np, np(1-p))$$

für n groß, laut ZGS

Faustregel für Binomialtest

Teststatistik $X \sim Bin(n,p) \approx N(np, np(1-p))$



$$K^c = \left[np - 1{,}96\sqrt{np(1-p)},\ np + 1{,}96\sqrt{np(1-p)}\right]$$

enthält ca. 95% der Werte, die X annehmen kann