$$\mathbb{P}(Z_n < a) \xrightarrow[n\to\infty]{} \phi(a) = \mathbb{P}(Z < a)$$

$$\mathbb{P}(Z_n \geq a) \xrightarrow[n\to\infty]{} \bar{\phi}(a) = 1 - \phi(a)$$

$\oplus$ $\mu = 0; \quad \sigma^2 = 1; \quad \frac{S_n}{\sqrt{n}} \xrightarrow[n\to\infty]{d} Z \in N(0,1)$

$$S_n = \sum_{j=1}^{n} X_j$$

$$\mathbb{P}\left(S_n \in (a\sqrt{n}; b\sqrt{n})\right) \sim \frac{1}{\sqrt{2\pi}} \int_a^b e^{-y^2/2}\, dy$$

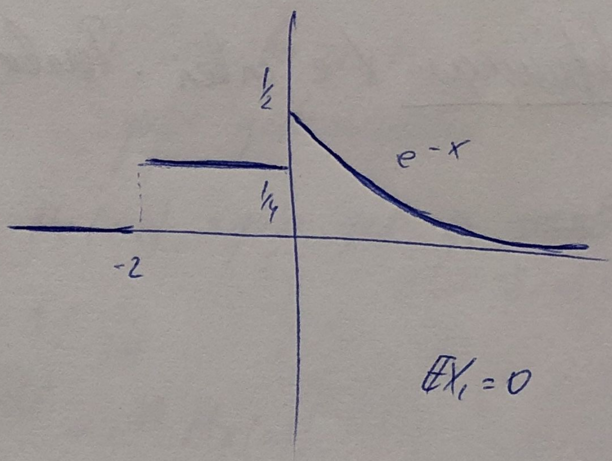
$$\mathbb{P}(S_n > 0) = \mathbb{P}\left(\frac{S_n}{\sqrt{n}} > 0\right) \approx \mathbb{P}(Z > 0) = \frac{1}{\sqrt{2\pi}} \int_0^{\infty} e^{-y^2/2}\, dy = \frac{1}{2}$$

$\mu = 0 \quad \sigma^2 = 1$

$$S_n = \sum_{j=1}^{n} X_j$$

$\mathbb{P}(S_n > 0) \sim 1/2$

$$f_{X_1}(x) = \begin{cases} \frac{1}{2} e^{-x} & x \geq 0 \\ \frac{1}{4} & x \in (-2, 0) \\ 0 & \text{inaczej} \end{cases}$$



$\mathbb{E}X_1 = 0$

$$X_i = \begin{cases} 1 & 1/2 \\ -1 & 1/2 \end{cases}$$

$$S_n = D_n - \Lambda_n = \sum_{j=1}^{n} X_j$$

$$\mathbb{P}\left(\frac{S_n}{\sqrt{n}} > a\right) \sim \bar{\phi}(a)$$

$$\parallel$$

$$\mathbb{P}(D_n > \Lambda_n + a\sqrt{n})$$

$$\parallel$$

$$\mathbb{P}\left(D_n > \frac{n}{2} + \frac{a}{2}\sqrt{n}\right)$$