

The Fundamental Theorem of Probability

(The Central Limit Theorem) Let the X_i be i.i.d. with respect to a random variable X with finite expected value and variance. Let S_N^* be the standardized sum of the X_i . Then for any real numbers $a < b$ we have

$$\text{Prob}(a < S_N^* < b) \rightarrow \frac{1}{\sqrt{2\pi}} \int_a^b e^{-x^2/2} dx$$