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Generating Normal (Gaussian) distributed random numbers

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$$N_1 \sim \sqrt{-2 \ln U_1} \sin(2\pi U_2)$$

$$N_2 \sim \sqrt{-2 \ln U_1} \cos(2\pi U_2)$$

This is the Box-Muller method (the polar form version) for generating two standard normal (Gaussian) distributed variables using two uniform distributed variables.

Symbol list:

U_1, U_2 Two independent uniform [0,1] distributed random variables

N_1, N_2 Two independent normal (Gaussian) distributed random variable