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Problemset 8 Spring 2015

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Problem 1.
Generate a histogram of gaussian distributed random numbers with mean value equal to zero and variance equal to one using (a) the Box-Müller algorithm and (b) the Metropolis algorithm. Calculate the correlation function $\langle x(t)x(t+\tau)\rangle$ for the sequence of numbers in both cases.

Try to figure out how you also can find error estimates for each of the binds of your histogram (hint : boot strapping). Do you expect to find equal uncertainty for each bin?

Is there another way to check if the random numbers satisfy a given probability function without having to calculate the histogram.[1].

[1]The problem with histograms is that there is no a priori way of obtaining the bin size. Hence, a given bin size may introduce artifacts into your analysis, in particular in the tails of the distribution where the probability by construction is low