Physics 371: Problem Set 2

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1. Garcia Problem 2.1.
2. Garcia Problem 2.16.
3. Garcia Problem 2.22
4. Generate a (long (*N=20000*)) random sequence using the linear congruential method, with the parameter set
   1. a = 7, c=0, M=10,
   2. a= 7^5, c=0, M= 2^{31}-1,
   3. Built in function (rand()).

   Calculate the associated correlation functions, C_j defined as $C_j = \sum_{i=1}^{N_j} \frac{(x_i - \langle x \rangle)(x_{i+j} - \langle x \rangle)}{\langle x^2 \rangle - \langle x \rangle^2}$.

   Plot the correlation functions for *j=1,...,20*. For any *j*, it must hold that $N_j < N$, but N_j must be large so that a good value for the average is obtained.
5. Write a program to calculate a random numer distributed according to *exp(-ax)* where *x>0*, and show that it is correct by calculating an associated histogram.