Random Number Generation

1. Using the *Linear Congruent Generator* with the following parameters and initial seed, generates *N = 10000* samples of a *Uniform* distribution in the range *[0,1)*.

m	2^{32}
a	1664525
c	1013904223
$seed$	521191478

2. With the numbers generated at the previous step, generate:
    a. N_1 = *10000* samples of an *Exponential distribution* of rate $\lambda = 0.1$
    b. N_2 = *10000* samples of a *Pareto distribution* with parameters *a = 1.5, m = 5*
    c. N_3 = *2500* samples of an Erlang distribution with *k = 4*, and $\lambda = 0.4$
    d. N_4 = *5000* samples of a Hypo-Exponential distribution with rates $\lambda_1 = 0.5, \lambda_2 = 0.125$
    e. N_5 = *5000* samples of a Hyper-Exponential distribution with rates $\lambda_1 = 0.5, \lambda_2 = 0.05$, $p_1 = 0.55$

   Please note that each of the previous cases should use exactly all the *N = 10000* samples of the *Uniform* distribution in the range *[0,1)* generated in the previous step.
3. For each distribution, compare on a plot the *Empirical distribution* obtained from the samples, with the corresponding real distribution (using its formula), in the range *x = [0,25]*.
4. The previous distributions correspond to the length of a file, expressed in GB. The charge for storing and making available each file by a provider is:
    a. *0.01 $/GB* if the file is less than *10 GB*
    b. *0.02 $/GB* if the file is greater than *10 GB*

   In other words, a file that is *2.5 GB* costs *0.025 $*, while one that is *12 GB* costs *0.24 $*.
   Compute the total cost for storing the N_i files in each of the previous five scenarios.