Homework n.5

1) Simulation of an experiment:

Extract N=20 random numbers distributed as an
exponential function with lifetime τ=2 (in some units)
Starting from N=20 random numbers uniformly distributed in [0,1]:
0.405059710 0.028044254 0.758571449 0.382914253 0.231949128 0.457176317
0.736658152 0.038088207 0.104203774 0.513283288 0.742335360 0.368812945
0.898926650 0.884993284 0.029905424 0.510855547 0.976764989 0.163296696
0.312905139 0.172199152

2) Suppose that the N=20 values generated at point 1) come from
corresponding N measurements of the lifetime of a decaying particle recorded
in a fixed interval of time Δt.
a) Write the likelihood $L(t \mid \tau, N_0)$ for the N measurements in the unbinned case
in order to apply the maximum likelihood fit to determine τ and rate of the decay.
b) Fill a histogram with 4 bins in [0,4]
Write the likelihood $L(t \mid \tau, N_0)$ in the binned case