TMA4265 Stochastic Processes
Week 45 – R exercise

Problem 1: Sum of exponentials are gamma distributed[Connected to Problem 2.64 in the book]

1. Make two vectors of independent draws from an exponential distribution with rate parameter $\lambda = 1$. Calculate the empirical mean and variance of the sum of the vectors. Which shape parameter, α, and rate parameter, β, for a Gamma-distribution give the observed mean and variance? Compare to the true values from Problem 2.64 in the book.

   Useful functions are `rexp(n, rate)`, `mean(x)` *and* `var(x)`.

2. Plot the values in the sum of the vectors in a histogram with probability density on the y-axis. Try using different number of simulations and different number of bins in the histogram.

   Useful functions are `hist(x, breaks, freq)`

3. Plot the true density function of the gamma on top of the histogram. Do they fit?

   Useful functions are `seq(from, to, length.out)`, `dgamma(x, shape, rate)` *and* `lines(x, y)`. *Note that some parameters of the* `seq`*-function is skipped. So* `length.out` *must be written explicitly as in, for example,* `seq(1, 10, length.out=20)`.