#1 Point process exercise

In this exercise we will investigate the point processes using spatstat package in R. Load the library using the syntax: `library(spatstat)`. This package contains several point data sets, you can read more about it in the "Practical session: R library spatstat" in the course webpage

a) Generate a random pointset of size 50 on the unit square. **Hint**: The function `runifpoint()` can be useful. Estimate the intensity using kernel estimation in the `spatstat` package, i.e. `density()` density.ppp{spatstat}. Investigate and play with the input parameters of the function. Argue for your choice of the input parameters.

b) Estimate the L function of your dataset in a) using the `Lest()` function in spatstat. The argument 'correction' in the function gives the type edge correction. Try out different variants, and compare in particular: `correction="isotropic"` and `correction="none"`.
Note: that the L-function in spatstat is linearly increasing with the radius; this is more common than the definition in the course book, where thee linear trend is subtracted.

c) We will now generate uncertainty bounds to check whether the clustering/repulsion effect we observe is significant. We do this by generating a large number of samples from the Poisson process with intensity 50 and compute L-function from each of these and then compute the percentiles of all the estimated L-functions. Hint use the `rpois()` function in R. Plot your estimated curve from a) together with the boundaries.

d) Rather than sampling the number of data in each round it is possible to fix the number of data you resample to the number in the sample you have. Thus you estimate the L function using many random samples of fixed sample size (i.e. 50 in our case). Argue why you should use one over the other. Redo the sampling using a fixed number, what is the difference in practice? In which case would the distinction be important?

e) The library `spatstat` contains the point sets, japanesepines, redwood and cells (so you do not need to load them). As a statistician you are given the task to investigate the three pointsets to detect clustering or repulsion using the L-function. What is your conclusion in the three cases?