Lab 7: Envelopes and Monte Carlo tests

This session is concerned with evelopes of summary statistics and Monte Carlo tests.
The lecturer's R script is available here (right click and save).

Exercise 1

For the `swedishpines` data:

1. Plot the K function along with pointwise envelopes from 39 simulations of CSR:

```
plot(envelope(swedishpines, Kest, nsim=39))
```

2. Plot the L function along with pointwise envelopes from 39 simulations of CSR.
3. Plot the L function along with **simultaneous** envelopes from **19** simulations of CSR, using `ginterval=c(0,0.5)`.
4. Plot the L function for along with **simultaneous** envelopes from **99** simulations of CSR using `ginterval=c(0,0.5)`. What is the significance level of the associated test?

Exercise 2

To understand the difficulties with the K-function when the point pattern is not spatially homogeneous, try the following experiment (like in the previous lab session).

1. Generate a simulated realisation of an inhomogeneous Poisson process, e.g.

```
X <- rpoispp(function(x,y){ 200 * exp(-3 * x) })
```

2. Compute simulation envelopes (of your favorite type) of the K- or L-function under CSR. They may well indicate significant departure from CSR.
3. Fit a Poisson point process model to the `japanesepines` data with log-quadratic trend (formula `~polynom(x,y,2)`). Plot the L-function of the data along with simultaneous envelopes from 99 simulations **of the fitted model**.