This homework is intended as an exercise in exploratory analysis for point patterns. You are asked to describe, using graphical methods and empirical functions (like Ghat, Khat and/or Lhat) the spatial point pattern in tupelo trees in three plots in South Carolina. The data set is on the course web site, tupelo.txt, and it contains the locations of male, female and junior tupelo trees in the Savannah River Swamp. The first column of the data set indicates the plot number (1, 2 or 3), the third column indicates the gender of the tree, the fifth and sixth columns are the x and y coordinates for the trees in each plot, transformed to meters.

You may wonder why you should care about the spatial distribution of the various types of trees? Well, the answer can be found in a paper by Shea, Dixon and Sharitz, which I posted on the web: "Size differences, sex ratio, and spatial distribution of male and female water tupelo, Nyssa Aquatica (NYSSACEAE)". Before you start this assignment, please read the paper. I think I have emphasized this a few times, but here it is again: we need to be aware of the scientific context in which we perform the statistical analysis in order to reach meaningful conclusions.

Here is what I need you to include in your report: a general description of the data set, with three graphs illustrating each of the plots, with each type of tree plotted in a different character (don't use colors this time!). In the written part you should verbally describe the three data sets, similarities and differences among the three plots, from an exploratory point of view. Then, for each of the three plots, produce a smoothed intensity map (you should discuss the choice of kernel, with an MSE type plot). Next, for each of the plots, consider the question of assessing the type of spatial pattern by using one of the empirical functions studied in class, and the simulated envelopes (for which, of course, you will need to specify how many simulations you have ran). Do this for all tree types first, then for each type of tree, separately, if you can. If you cannot, explain why. Then compare, visually, the differences in patterns in different plots and different types of trees, and write your conclusions (assume your audience is composed of biology researchers, who most likely understand spatial statistics, but would really like to hear the biological interpretation!)

In terms of computing, this should all be pretty straightforward in Splancs, and I gave you the necessary commands in Labs 6 and 7. Remember that it is really easy to subset a matrix using a criteria like the plot number in the following way: tupelo.1<-tupelo[tupelo[,1]==1,].

Good luck and have fun writing a nice report!!