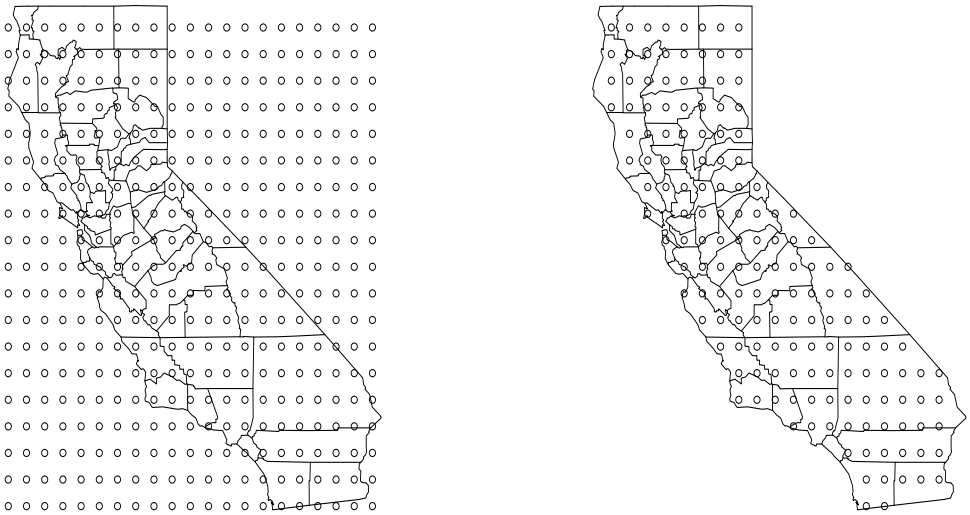
University of California, Los Angeles
Department of Statistics

Statistics C173/C273 **Instructor: Nicolas Christou**

Homework 6

Exercise 1
For this exercise please select a US state or country to answer the following questions.

a. Generate a regular grid of points similar to this one and select only the points within the map.



b. Using the method of spectral decomposition generate geostatistical data at the points generated in (a). Note: Use a covariance function and parameters of your choice.

c. Construct a rose diagram using directional variograms (begin with the NS direction and then move clockwise by 20^0).

Exercise 2
Load the `data(parana)` data (you need to load `geoR` first) and check the details of the data set using `help(parana)`. Answer the following questions:

a. Perform an explanatory analysis.

b. Would you include a trend in the model?

c. Is there evidence of spatial correlation? Construct h-scatterplots and empirical variogram(s). Fit a theoretical variogram to the empirical variogram(s).

d. Use the inverse distance interpolation method (`idw`) to make predictions at a dense grid of your choice. .

Exercise 3
Consider the elevation data:

```
a <- read.table("http://www.stat.ucla.edu/~nchristo/statistics_c173_c273/
elevation.txt", header=TRUE)
```

Use a simple regression model with elevation as the response variable and north-south direction (y) as the predictor. Fit the model using ordinary least squares and by examining the residuals decide what other predictors and/or transformations need to be included in the analysis of elevation.