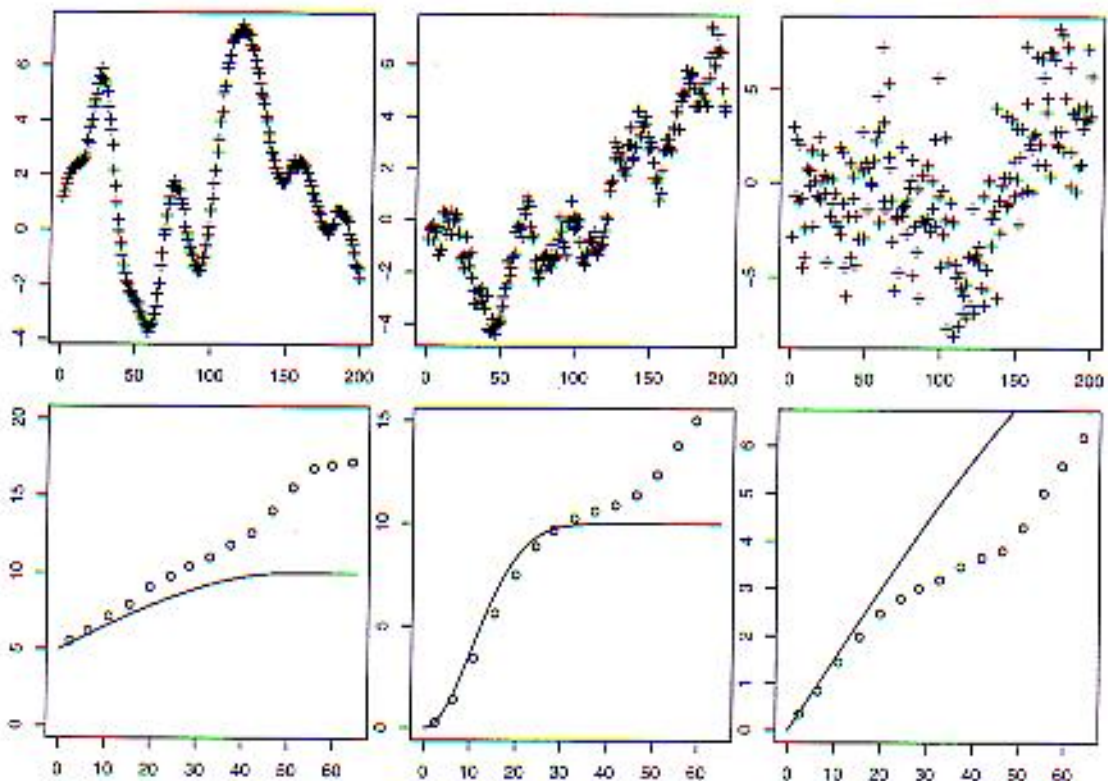


Master Physical Geography, Spatial Analysis and GIS 2 (geo4-4412)
 Final test
 Wed Jan 31, 2007, 9:00 - 12:00

Please answer all questions. If computations are required, provide intermediate steps.

1. Give three advantages of kriging over inverse distance interpolation, and give two advantages of inverse distance interpolation over kriging.
2. Below is a figure with three transects with real data variables (top row, left-to-right: 1, 2, 3) and three sample variograms (o) and models (—) used to simulate the variables (bottom row, left-to-right: a, b, c). Which variogram (1, 2, 3) belongs to which data variable (a, b, c)? Explain your answer briefly.



3. Explain the differences between simple kriging, ordinary kriging, universal kriging and cokriging, in terms of the underlying model or assumptions.

4. A physical geographer is faced with the problem of interpolating an air quality variable (the average NO₂ concentration in ppm for 2006) over a region (the Netherlands). She chooses to use ordinary point kriging for this. The kriging standard errors are however so large that 95% prediction intervals are too wide to be able to conclude something sensible, based on the maps.

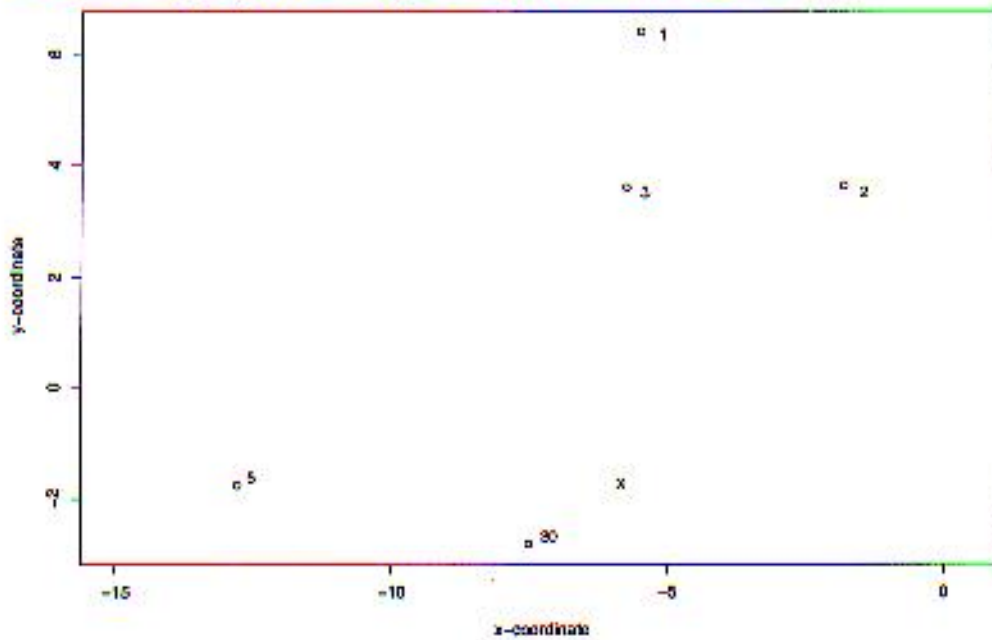
In order to improve the prediction (i.e., get smaller prediction intervals), give two distinct options for her to apply herself, and one option she could give to the agency that gave her the job to create the map.

5. Given the data in the table below, compute the sample variogram for lags 1, 2, 3 and 4, and draw the sample variogram.

x-coordinate	y-coordinate	measured value
1	0	6.8
1	1	10.5
1	2	9.6
1	3	7.0
1	4	2.0
1	5	3.8
1	6	12.4
1	7	13.6
1	8	8.7
1	9	7.9

6. a Why do we use the rule of thumb that the sample variogram is computed (with a cutoff) up to one third of the spatial extent of the data?
- b Describe and draw three different variogram model types, and give their names.
- c Why do we compute and model variograms? (answer in max. 10 lines)

7. In the example below, the kriging estimate at x is 20. This was obtained using a spherical variogram model without nugget, with range 5 and with sill 1. For each of the cases below, tell whether the kriging estimate will remain equal, become larger or become smaller than 20



- a spherical variogram model without nugget, with range 5 and with sill 5
- a spherical variogram model without nugget, with range 5 and with sill 20
- a pure nugget model