STAT 696, Spring 2011
Homework 8 Problems
due Thursday April 21

1 (long) Problem. Please follow the Lab report directions off the homework web page.

1. **Walker Lake Data**. We will perform a spatial analysis of a dataset derived from a digital elevation model from the western United States of the Walker Lake area in Nevada. We will consider a subsample of the original dataset. We will use the variables U and V, the concentration of a pollutant (in ppm). The data is available in the gstat package using the R command `data(walker)`.

We will use the U sample as the target variable. It is of interest, but expensive to sample. We can use the V as a covariable, since it is less expensive to sample. We can follow the tutorial on Cokriging under Example 3 in Lab 6, starting with Section 6 Modelling a bivariate coregionalization. Note, in this section (OM) is the covariable and (Pb) is the target variable.

(a) Complete Task 17 and make the corresponding Figure 9 for the covariable vs target variable data. It is a good idea to transform each dataset, so that each is reasonably normal.

(b) Complete Task 18 for the covariable transformed V. Note: Task 18 assumes that you already have a fitted variogram for the target variable. You will have to fit a variogram to the transformed U data to compete this task. The tutorial fit a varigram to the target variable for Task 9.

(c) In order to build a model for coregonalization, complete Task 19. Then complete Task 20 and make a corresponding Figure 11. You do not need to use the plot option `pl=T`, unless you would like to.

(d) Complete Task 21. Your gstat object should have data and models. The three variograms should have the same range. Make the corresponding Figure 12 for your data.

(e) You do not need to compare the models, so you can skip Section 6.4 and go to Section 7 to complete Task 22 on a grid for the transformed U data. You will need to make a grid using the makeagrid.r code from Lab 6. In addition, make a plot of the kriging predictions and kriging variances on the grid. You do not need to complete Task 23, just use the `spplot` function.

(f) You are done with the tutorial. Compare cokriging predictions and variances to kriging predictions and variances using universal kriging (or ordinary kriging) for the transformed U data on the grid from part (e). What do you conclude?