Exercise 1:
Use log(Pb) as the target variable and log(Cu), log(Zn) as the collocated variables.

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

Answer the following questions:

a. Create a gstat object using the target variable. Compute the sample omnidirectional variogram and fit a model to it.

b. Now create a new gstat object using the target variable and then append to it the other two collocated variables. Using the model of coregionalization fit a model to the auto and cross variograms.

c. Perform cross validation between ordinary and cokriging.

d. Create a dense grid for kriging predictions (use by=0.05). Perform cokriging predictions on the grid and use them to construct a raster map. Assign NA values to the region outside the observed points. Finally add contours to the map.

Exercise 2:
Use log(Pb) as the target variable and log(Cu) as the collocated variable.

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

Answer the following questions:

a. Plot and fit the spherical semivariogram to the auto and cross semivariograms by assuming trend of degree 1. Obtain the values for the nugget, the partial sill, and the range for each one of them.

b. Now we will use the procedure discussed in the paper by Stein and Corsten (see handout #60). Suppose we have observed the target variable at the first 159 locations only (in the data set there are 359 locations). We will also assume that the collocated variable is observed in all 359 locations. Identify the points of both data sets using different colors.

c. We want to predict a new point at location (2, 2). Show the point on the plot with a different color.

d. Use the information from the paper (pages 577-578) to predict the point (2, 2) using universal cokriging.