Due: Wednesday 7 June, 2006.

Uncertainty and sensitivity analyses are highly important in deterministic models, especially if the models have many parameters and if there is heterogeneity or uncertainty in the parameters.

You will be given two MS-Excel spreadsheets: one containing a list of all parameter values used in an epidemic model over 1000 simulations and the other file containing the outcome variables from running the deterministic model with those specific input parameters. Your job is to carry out a sensitivity analysis; you are to choose one of two analyses to perform (1) write code to determine partial rank correlation coefficients (PRCCs); or (2) response hypersurface modeling.

All results and code written to produce the results are to be submitted electronically (via email to dp.wilson@unsw.edu.au).

1. PRCCs

   Write code in your choice of Matlab/Maple/C to calculate the partial rank correlation coefficients of each input parameter-outcome variable combination.

   Optional: calculate the corresponding t-score and p-value associated with the correlation. Produce tornado plots (histograms of the PRCC values)

2. Response Hypersurface Modelling

   Using linear algebra techniques, and/or in-built packages in the platform of your choice, determine the coefficients of the hypersurface that best-fits each of the outcome variables.

   Optional: Based on the terms in your best-fitting hypersurface equations pick the 2 most important parameters for each outcome variable, carry out the hypersurface modelling using just these two parameters and produce a 3-dimensional plot of the surface.