Statistics 850 **yandell** **Spring 1995**

Homework # 4—Due Mon 27 Feb

Consider the `catalyst` example from the handout entitled "Catalyst Interaction Plot Using S". This example comes from Chapter 5 of *Statistical Models in S* by Chambers and Hastie (1992). However, relevant details are included in the handout and below.

Basically, there are 3 design factors, `Temp`erature, and `Conc`entration and `Cat`alyst type, each at 2 levels, in a completely randomized design. That is, there are 8 cells, or levels of treatment combinations, with two replications per cell. The broad goal is to determine what factors (main effects, or factor combinations through interaction) affect the response, `Yield`.

(a) Develop plots to display the key features of these data. You may want to begin with ideas in the handout. This part may be incorporated into the following sections of the problem.
(b) Fit a model which ignores `Conc`. Present results and interpret.
(c) Examine the lack of fit caused by ignoring `Conc`. This may be done using residual plots and/or formal tests.
(d) Develop a full model which includes all possible interactions.
(e) Reduce the full model to a "parsimonious" model which only includes significant terms, plus terms needed to maintain hierarchy (i.e. main effects if interactions are significant).
(f) Interpret the "final" model in words. Use your plots and analyses to demonstrate the strength of evidence.

The data can be found in file `hwk4.dat` (in the usual directory, `/p/stat/course/st850-yandell/data`), with some SAS and S suggestions for this problem in `hwk4.sas` and `hwk4.s`, respectively, for your information.