CHAPTER 7

Reserved Problems

7.1R Consider the alloy cracking experiment described in Problem 6.2R. Suppose that only 16 runs could be made on a single day, so each replicate was treated as a block. Analyze the experiment and draw conclusions.

7.2R Using the data from the 2^4 design in Problem 6.4R, construct and analyze a design in two blocks with *ABCD* confounded with blocks.

7.3R Consider the direct mail experiment in Problem 6.5R. Suppose that each group of customers is in a different part of the country. Suggest an appropriate analysis for the experiment.

7.4R Consider the isatin yield experiment in Problem 6.7R. Set up the 2^4 experiment in this problem in two blocks with ABCD confounded. Analyze the data from this design. Is the block effect large?

7.5R The design in Problem 6.3R is a 2^4 factorial. Set up this experiment in two blocks with ABCD confounded. Analyze the data from this design. Is the block effect large?

7.6R Design an experiment for confounding a 2^6 factorial in four blocks. Suggest an appropriate confounding scheme, different from the one shown in Table 7.9.

7.7R Suppose that a 2^2 design has been conducted. There are four replicates and the experiment has been conducted in four blocks. The error sum of squares is 500 and the block sum of squares is 250. If the experiment had been conducted as a completely randomized design, the estimate of the error variance σ^2 would be

(a) 25.0 **(b)** 25.5 **(c)** 35.0

(d) 38.5 **(e)** none of the above

7.8R Suppose that you are designing an experiment for four factors and that due to material properties it is necessary to conduct the experiment in blocks. Material availability restricts you to the use of two blocks but each batch of material is large enough for up to 10 runs. You can afford to make four additional runs beyond the 16 required by the full 2^4. What runs would you choose to make? How would you allocate these additional four runs to the two blocks?

7.9R Consider a 2^3 factorial design (8 runs). It is necessary to run this design in blocks, but the material availability requires the block size to be 3 runs. Recommend a design. Are the estimates of the main effects and the two-factor interaction effects uncorrelated?

7.10R Consider a 2^3 factorial design (8 runs). It is necessary to run this design in blocks, but the material availability requires the block size to be 3 runs. In addition, the experimenter would like to replicate 2 runs so that an estimate of experimental error can be obtained. Recommend a design.

7.11R Suppose that you plan to use a 2^4 design (16 runs), but you need to use two blocks of size 8. Recommend a design that would allow you to estimate all 15 effects.

7.12R In a 2^4 factorial design in two blocks with ABCD confounded, the runs a and *abc* are in the same block.
True **False**

7.13R The information on the interactions that are confounded with the block effects can always be separated from the block effect. **True** **False**

7.14R You plan to conduct an experiment involving 3 factors each at 2 levels. Blocking is necessary, and you have enough material for 2 blocks. However, each block can accommodate 6 runs. Design an appropriate experiment. Are the estimates of the main effects and two-factor interactions uncorrelated?