

**STAT 8200 — Design of Experiments for Research Workers**  
**Homework 6 – Due Tuesday, December 3, 2013**  
**SHOW ALL WORK**

- Read Chs. 14 and 16 of our text (the book by Oehlert). In addition do the following problems.
1. Do problem 14.1 on p.380 of our text. In answering this problem, complete the following steps.
    - a. What are the values of  $r, k, b, a$  and  $\lambda$  for this design?
    - b. Analyze these data. State the model that you use, present the ANOVA Table, and test for main effects of sprays. In addition, estimate the variance component that quantifies variability from one bed to another as well as the proportion of the total variance that is due to bed-to-bed differences.
    - c. In a situation like this, it is often of interest to “pick the winner”. What is the best spray to use (the spray that produces the fewest number of beetles on the plants)? Which sprays are significantly worse at suppressing beetles than the best spray? To answer this question, the best approach is to use Dunnett’s procedure for multiple comparisons with the best treatment. See §5.5 of our text and, in particular, §5.5.2.
  2. Do problem 14.5 on pp. 383–384 in our text.
  3. Do problem 16.6 on pp.446–447 in our text.
  4. Do problem 16.8 in our text. In answering this problem, complete the following steps.
    - a. Identify the following: (i) the split plots, (ii) the whole plots, (iii) the split plot factor, (iv) the whole plot factor, (v) the treatment structure for whole plots, (vi) the design structure for whole plots, (vii) the treatment structure for split plots, and (viii) the design structure for split plots.
    - b. Analyze these data. State the model that you use; present the ANOVA Table; test for main effects of sign (yes/no), timing, and a sign\*timing interaction. State your conclusions.
    - d. Use orthogonal polynomials to determine whether or not traffic speed is linear in the controlled timing between vehicles. State your conclusions.