QUEEN MARY, UNIVERSITY OF LONDON

MAS 314 Design of Experiments

Assignment 2 For discussion on 23 January 2007

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1 A completely randomized experiment was conducted to compare seven treatments for their effectiveness in reducing scab disease in potatoes. The field plan is shown below.

2 9	1 12	6 18	4 10	6 24	7 17	5 30	3 16
1 10	5 7	4 4	3 10	5 21	1 24	1 29	6 12
2 9	7 7	3 18	1 30	3 18	7 16	2 16	4 4
5 9	1 18	7 17	6 19	1 32	4 5	1 26	2 4

The upper figure in each plot denotes the treatment, coded 1–7. The lower figure denotes an index of scabbiness of potatoes in that plot: 100 potatoes were randomly sampled from the plot, for each one the percentage of the surface area infected with scabs was assessed by eye and recorded, and the average of these 100 percentages was calculated to give the scabbiness index.

(a) Give the analysis-of-variance table for these data, without using a computer.

(b) Is there any evidence that the mean scabbiness is different according to different treatments? Justify your answer.

(c) Estimate the mean scabbiness produced by each treatment.

(d) What is the standard error of the above estimates?

(e) What is the standard error of the differences between means?

2 A technician has to measure the acidity of four soils. You give him three samples of each soil and ask him to make the twelve measurements in random order. He says that a random order will confuse him and that it will be better if he measures the acidity of all three samples of soil A, then all three samples of soil B, and so on. Make notes on arguments you will use to persuade him that a random order is better.