

Home Work 6

- 1 Scientists ran two replicates of a 2^2 design to determine the effect of kind of ignitor and type of main charge of the delay time of a fuse. They definitely want to keep the delay time under 30 seconds. The results of the experiment were

| Ignitor | Main Charge | Rep. 1 Delay | Rep. 2 Delay |
|---------|-------------|-----------------|-----------------|
| 1 | 1 | 10.70 | 9.82 |
| 2 | 1 | 18.42 | 18.62 |
| 1 | 2 | 15.04 | 16.02 |
| 2 | 2 | 22.94 | 31.22 |

- (a) Draw a box and attach the sample means at the corners.
 - (b) Estimate the main effect of Ignitor, main effect of Charge and their interaction. Base your calculations on your figure in Part(a).
 - (c) Calculate 95 % confidence intervals for your estimates in Part (b). Interpret the results.
 - (d) Write the design with three columns of ± 1 and calculate the estimated effects using this column and the column of means.
- 2 The experiment in Problem 1 was actually part of a larger experiment that involved two different booster charges, one powder and one pellet.

| Ignitor | Main Charge | Booster | Rep. 1 Delay | Rep. 2 Delay |
|---------|-------------|---------|-----------------|-----------------|
| 1 | 1 | powder | 10.70 | 9.82 |
| 2 | 1 | powder | 18.42 | 18.62 |
| 1 | 2 | powder | 15.04 | 16.02 |
| 2 | 2 | powder | 22.94 | 31.22 |
| 1 | 1 | pellet | 10.02 | 10.36 |
| 2 | 1 | pellet | 22.80 | 25.14 |
| 1 | 2 | pellet | 27.26 | 21.42 |
| 2 | 2 | pellet | 32.92 | 21.38 |

- (a) Draw a cube and attach the sample means at the corners.
 - (b) Estimate the the main effects, the three two factor interactions and the three factor interaction. Base your calculations on your figure in Part(a).
 - (c) Calculate 95 % confidence intervals for your estimates in Part (b).
 - (d) Write the design with seven columns of ± 1 and calculate the estimated effects using this column and the column of means.
- 3 Check your answers to problems 1. and 2. Comment on any differences. How do the sums of squares for any factor compare with estimated effect in each case?