

Series 3

1. Estimate all effects in the following 3×3 designs. Do interactions exist?

a)

| | | B | | |
|---|---|----|----|----|
| | | 1 | 2 | 3 |
| A | 1 | 10 | 15 | 20 |
| | 2 | 10 | 15 | 20 |
| | 3 | 10 | 15 | 20 |

b)

| | | B | | |
|---|---|----|----|----|
| | | 1 | 2 | 3 |
| A | 1 | 26 | 22 | 21 |
| | 2 | 23 | 19 | 18 |
| | 3 | 17 | 13 | 12 |

c)

| | | B | | |
|---|---|----|----|----|
| | | 1 | 2 | 3 |
| A | 1 | 26 | 23 | 20 |
| | 2 | 18 | 19 | 23 |
| | 3 | 13 | 15 | 14 |

2. Factors affecting drills are investigated in an experiment. The response variable Y is drill in inches. The factors are:

A = load on drill (high/low)

B = flow rate (high/low)

C = rotational speed (high/low)

D = type of mud used

The data are in the file `drill.txt`.

```
drill<-read.table("http://stat.ethz.ch/Teaching/Datasets/drill.txt",header=TRUE)
```

- a) Plot the data.
 - b) Do an analysis with all main effects and all interactions.
 - c) Do an analysis with all main effects and all 2-fold interactions.
 - d) Check the residuals and improve your model if necessary.
3. Four factors are supposed to influence the flavor of softdrinks: sugar, carbonation, sirup concentration and temperature. The four factors were investigated in an experiment with two levels each. Therefore 16 different products were tested. Each product was assessed by 20 persons with a score between 1 and 20. The response variable is the total score of the 20 persons. There are two replicates of the 2^4 design. The data are in `softdrinkANOVA.txt`.
- ```
soft<-read.table("http://stat.ethz.ch/Teaching/Datasets/softdrinkANOVA.txt",header=TRUE)
```
- a) Plot the data.
  - b) Analyze the data. Which factors are important?

**Preliminary discussion:** 05.11.2012.

**Deadline:** 12.11.2012.