

## Computer lab 4

The computer lab consists of the following parts

- The replicated  $2^2$  full factorial designs.
- The replicated  $2^3$  full factorial designs.

### 1 The $2^2$ designs

In this section we perform the  $2^2$  replicated full factorial design. We use the data from the Problem 8 in Chapter 5 in [1].

First, let us assume that we have only got the data for the Week1 and there are only two factors, Temperature and Catalyst, are known. The data are contained in the file *BHHp8ch5.csv*. Let us upload the data:

```
data = read.csv("BHHp8ch5.csv")
```

Then we create the variables with the names of the columns of the frame:

```
attach(data)
```

Next we apply the function *aov* to a model that describes the response *Y* by two factors T and C (Temperature and Catalyst, respectively) with interaction:

```
av = aov(Y ~ T * C)
```

and print out the ANOVA table

```
summary(av)
```

At the end do not forget to detach the names:

```
detach(data)
```

The questions:

1. What can you conclude from the ANOVA table?
2. Check the model adequacy by checking the residuals.

## 2 The $2^3$ designs

First, let us assume that we have got the data for the Week2.

The question:

1. Modify the data table "*BHHp8ch5.csv*" in an appropriate way and perform an analysis. Should we treat the Week as a factor variable?

Next, assume that we have also got the values of the factor pH. The question:

1. Modify the data table "*BHHp8ch5.csv*" in an appropriate way and perform an analysis.
2. Check the model adequacy by checking the residuals.

## Referenser

- [1] BOX, G. E. P., HUNTER, J. S. and HUNTER, W. G. (2005). Statistics for Experiments John Wiley & Sons.