Homework 5 - AGST 5014

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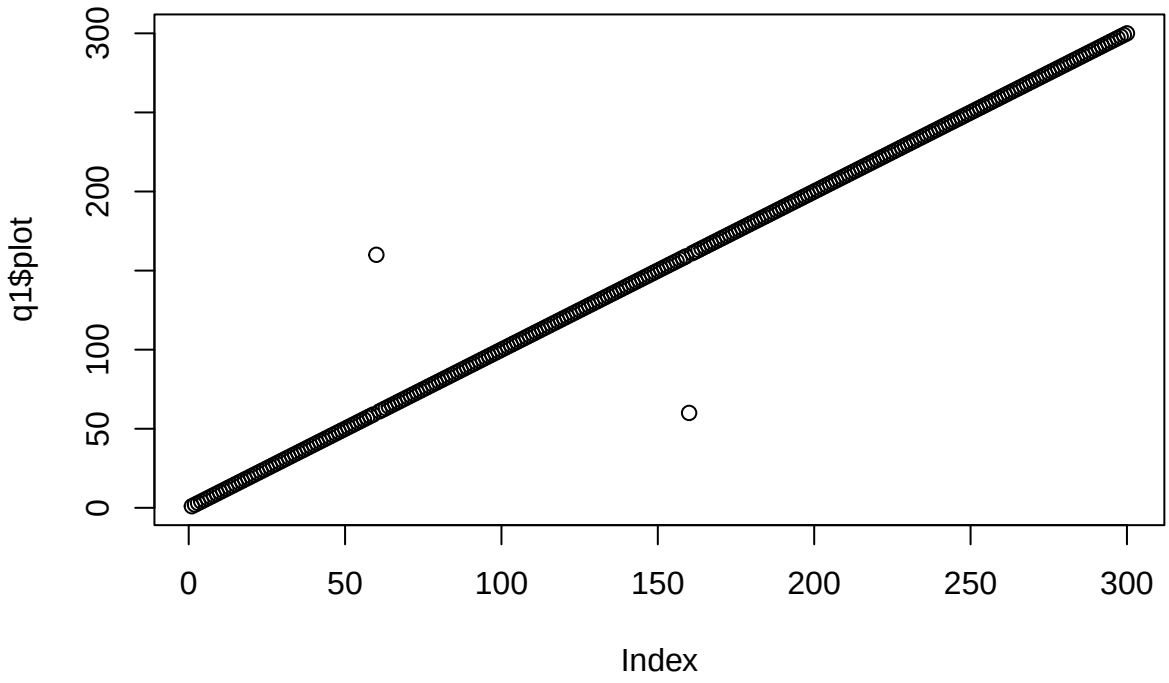
1. The following data set has 2 mistakes. Find the issue and analyze the experiment. Include all the necessary analysis and interpretation

```
q1 <- read.csv("HW5_Q1.csv")
q1$row <- as.factor(q1$row)
q1$col <- as.factor(q1$col)
q1$rep <- as.factor(q1$rep)
q1$cultivar <- as.factor(q1$cultivar)
q1$fertilizer_application <- as.factor(q1$fertilizer_application)
str(q1)
```

```
## 'data.frame':    300 obs. of  8 variables:
##  $ plot                  : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ row                   : Factor w/ 12 levels "1","2","3","4",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ column                : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ rep                   : Factor w/ 5 levels "1","2","3","4",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ cultivar              : Factor w/ 20 levels "1","2","3","4",..: 1 1 1 2 2 2 3 3 3 4 ...
##  $ fertilizer_application: Factor w/ 3 levels "April","June",..: 1 2 3 1 2 3 1 2 3 1 ...
##  $ y                     : num  10.1 10 10.5 10.2 10 ...
##  $ col                   : Factor w/ 25 levels "1","2","3","4",..: 1 2 3 4 5 6 7 8 9 10 ...
```

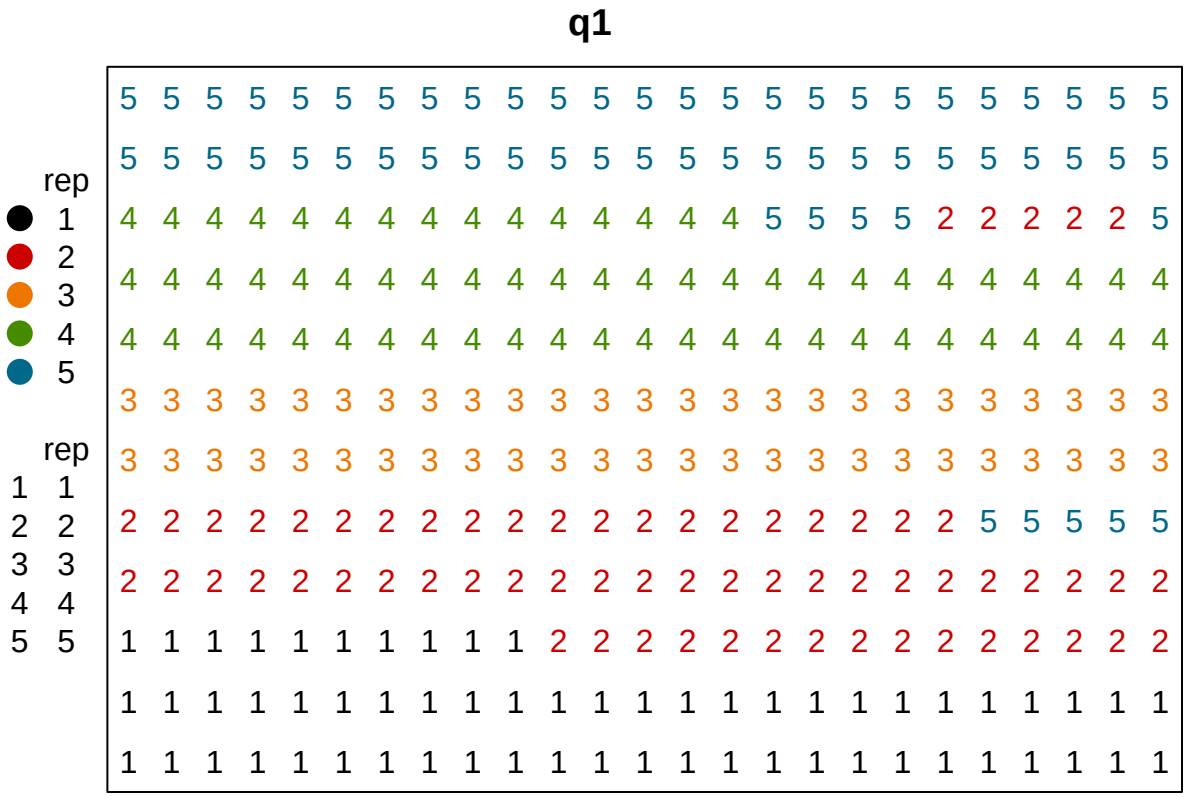
```
plot(q1$plot)
```



The plot 160 should be labelled as 60, and the plot 60 should be labelled as 160.

```
desplot::desplot(
  q1,
  ~ col * row,
  cex = 1,
  text = rep,
  col = rep
)
```

```
## Warning in Ops.factor(col, row): '*' not meaningful for factors
```



The row 5 with columns 21 to 25 should be labelled as rep 2 rather than rep 5, and the row 10 with columns 20 to 25 should be labelled as rep 5 rather than rep 2.

2. Design an experiment to answer the following questions (Attach the CSV file and include below a figure with the layout of your experiment):

a) Does increasing the dose of nitrogen affect yield? Does it depend on the frequency of irrigation? or on the cultivar? In the allocated field, I have some areas that are more fertile than others. I have resources for a total of 90 EU.

b) Is there a variation in bacteria/fungus growth with different agar types (semi-solid, gel-like state)? I have 30 plates (experimental unit) available.

3.The data set `mcconway.turnip` from the package `agridat` presents us with an RCBD experiment of turnips with 16 treatments allocated at random to each of four blocks The 16 treatments were combinations of two varieties, two planting dates, and four densities. a) Run anova as usual. Are the requirements met? b) Run a mixed model considering block as a random term. c) If there is any issue with the data that result in not meeting the ANOVA assumptions, use a mixed model to solve it.

```
library(tidyverse)
q3 <- agridat::mcconway.turnip %>%
  as_tibble() %>%
  mutate(densf = density %>% as.factor)
```