Homework 3

Earle Aguilar
804501476
01-27-2017

3.4

Source	DF	SS	MS	F	P
Factor	4	987.71	246.93	33.10	≈ 0
Error	25	186.53	7.46		
Total	29	1174.24			

3.5

3.16

a

There are no signs that the temperature affects density. The p-value of the anova test is 0.1569.

```
m1 <- lm(Density ~ Temp, p16)
anova(m1)
```

```
## Analysis of Variance Table
##
## Response: Density
##           Df  Sum Sq  Mean Sq F value Pr(>F)
## Temp       3 0.15611 0.052037  2.0237 0.1569
## Residuals 14 0.36000 0.025714
```

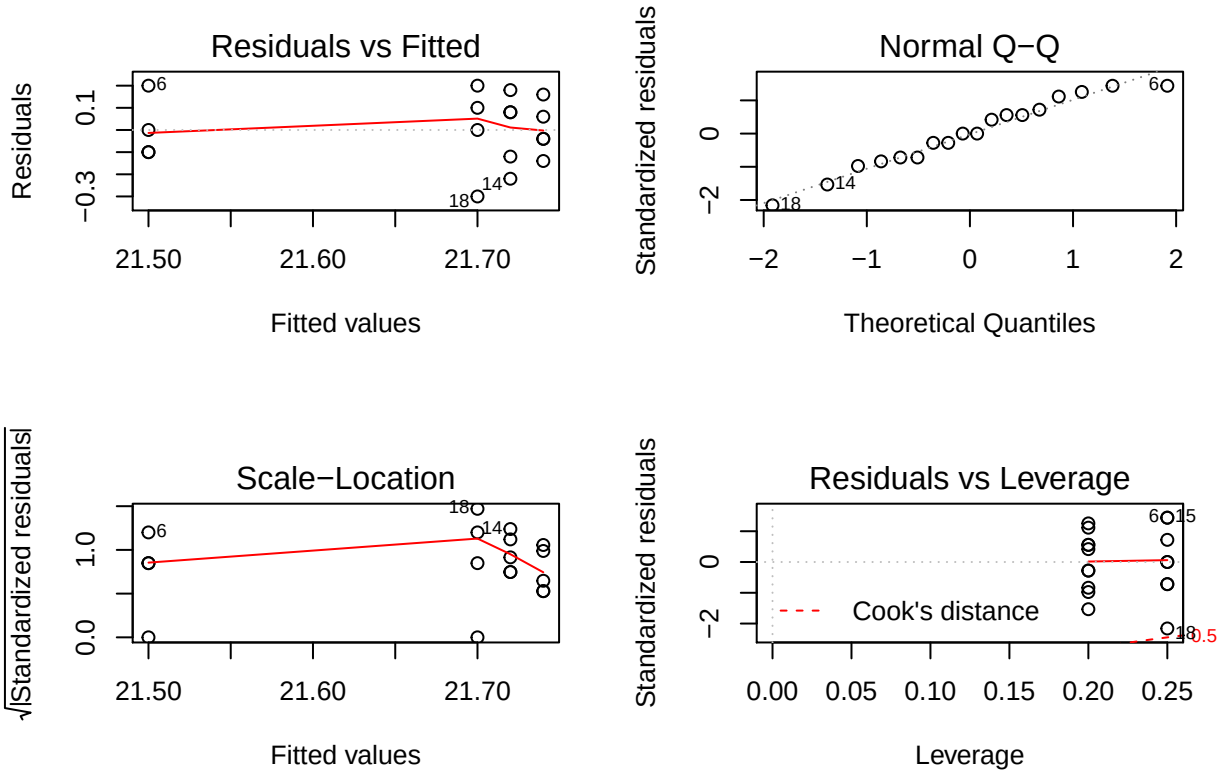
b

TODO

c

There is no signs of non-constant variance in the residual plot.

```
par(mfrow=c(2,2))
plot(m1)
```



3.26

a

```
m2 <- lm(Life ~ Brand, p26)
anova(m2)
```

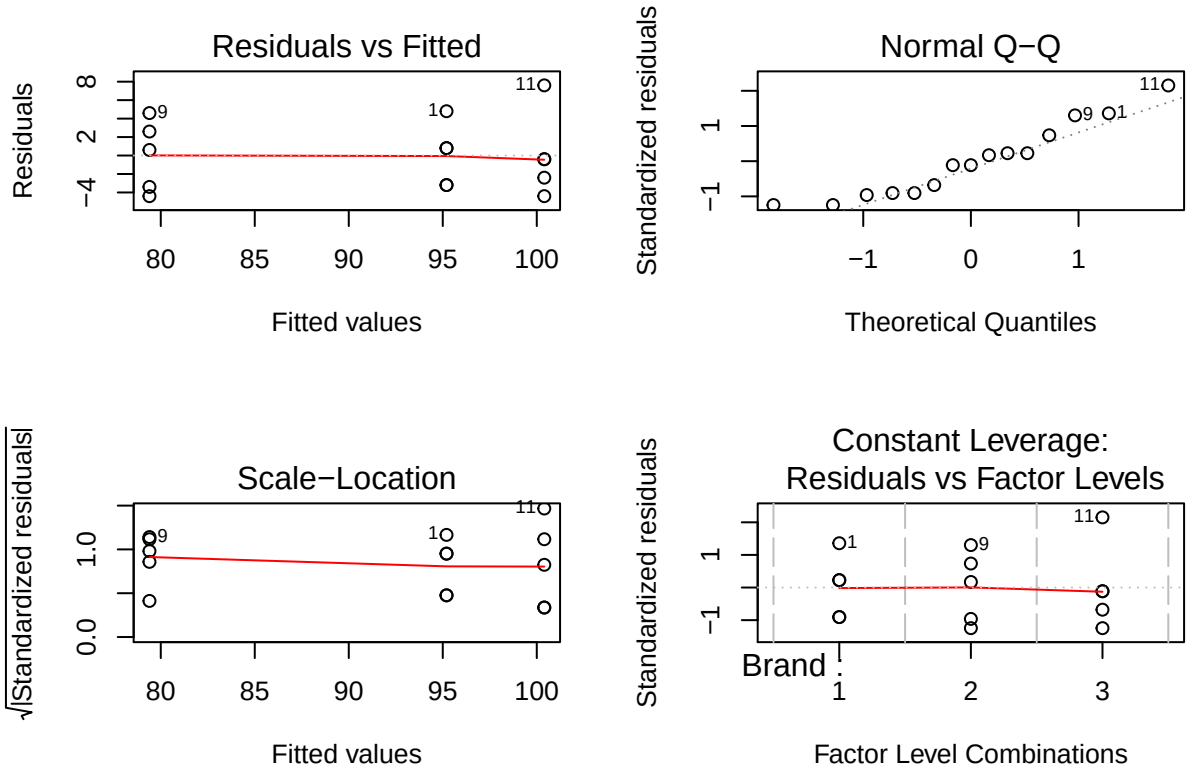
```
## Analysis of Variance Table
##
## Response: Life
##           Df Sum Sq Mean Sq F value    Pr(>F)
## Brand      2 1196.1  598.07  38.338 6.141e-06 ***
## Residuals 12  187.2   15.60
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The lives of the batteries are different. The p-value of the F-test produced by ANOVA is 6.141×10^{-6}

b

The residual plot shows that there is nothing wront. There is no trend line and the variance is constant.

```
par(mfrow=c(2,2))
plot(m2)
```



c

95% **CI for Battery Brand 2**

```
b <- p26[p26$Brand == 2,]
mean_b <- mean(b$Life)
sd_b <- sd(b$Life)
k <- qt(p = 0.975, 4)
se <- k * (sd_b/sqrt(5))
c(mean_b - se, mean_b +se)
```

```
## [1] 74.62322 84.17678
```

99% **CI for Difference of Means**

```
c <- p26[p26$Brand == 3,]
mean_c <- mean(c$Life)
sd_c <- sd(c$Life)
s_pooled <- (4*sd_c^2 + 4*sd_b^2) / 8
D <- mean_b - mean_c
t <- qt(0.99, 8)
se <- t* sqrt(s_pooled*(2/5))
c(D - se, D+se)
```

```
## [1] -28.72872 -13.27128
```

d

TODO

3.27

a

There is no evidence that suggest the catalysts have an effect on the concentration.

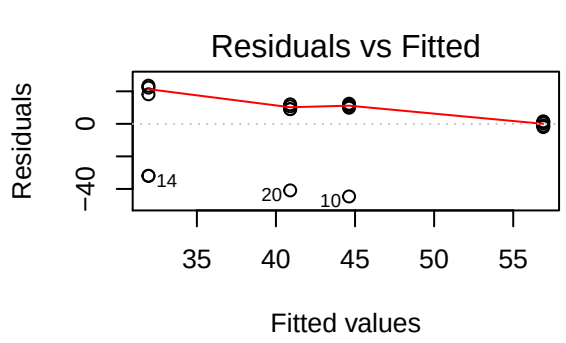
```
m3 <- lm(Concentration ~ Catalyst, p27)
anova(m3)
```

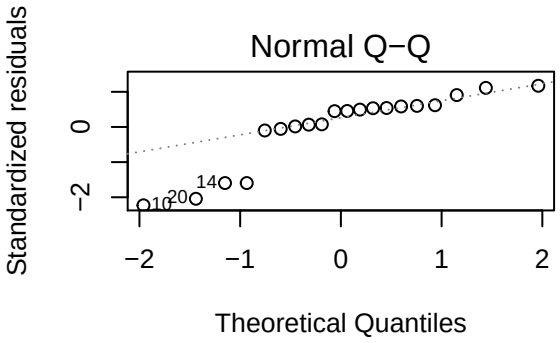
```
## Analysis of Variance Table
##
## Response: Concentration
##           Df Sum Sq Mean Sq F value Pr(>F)
## Catalyst   3 1605.9  535.29  1.0686 0.3901
## Residuals 16 8014.8  500.92
```

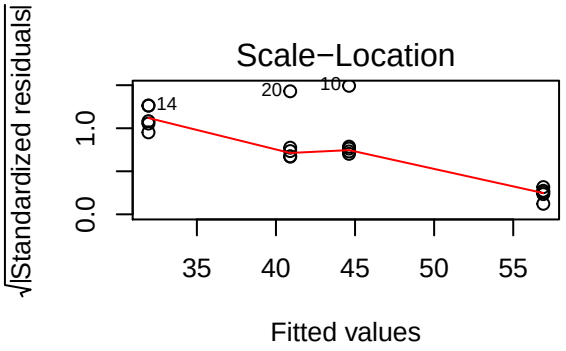
b

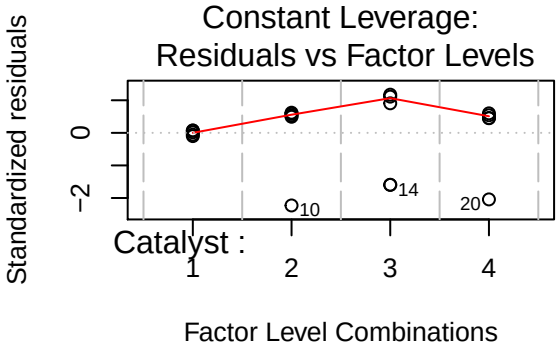
There are signs of non constant variance.

```
par(mfrow=c(2,2))
plot(m3)
```









c

```
c1 <- p27[p27$Catalyst == 1,]
mean_c1 <- mean(c1$Concentration)
sd_c1 <- sd(c1$Concentration)
t <- qt(0.99, 4)
se <- t * (sd_c1/ sqrt(5))
c(mean_c1 - se, mean_c1 + se)
```

```
## [1] 54.35318 59.44682
```