Entregable 2 solucions

R Markdown

```r
setwd("~/pie")
library(car)
```

```
## Loading required package: carData
```

```r
dd<-read.csv2("dades.csv")

Days <- dd$Days
FDays <- as.factor(Days)

write("ModA","")
```

```
## ModA
```

```r
write("Ap: 1","")
```

```
## Ap: 1
```

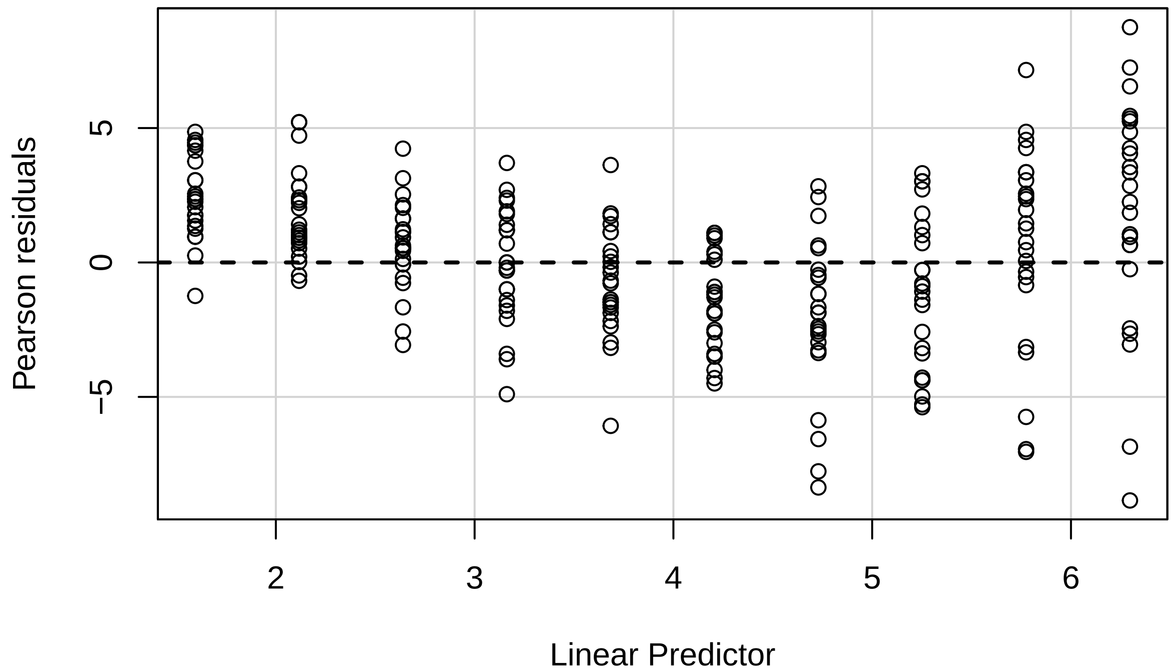
```r
print(summary(mA <- glm(H ~ Days,
                        family = gaussian(link="sqrt"),
                        data = dd)))
```

```
##
## Call:
## glm(formula = H ~ Days, family = gaussian(link = "sqrt"), data = dd)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -8.8501  -1.6155   0.5327   2.2260   8.7499
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.445310   0.069255   20.87   <2e-16 ***
## Days        0.037319   0.000698   53.47   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 8.846354)
##
##     Null deviance: 35055.7  on 239  degrees of freedom
## Residual deviance:  2105.4  on 238  degrees of freedom
## AIC: 1208.3
##
## Number of Fisher Scoring iterations: 6
```

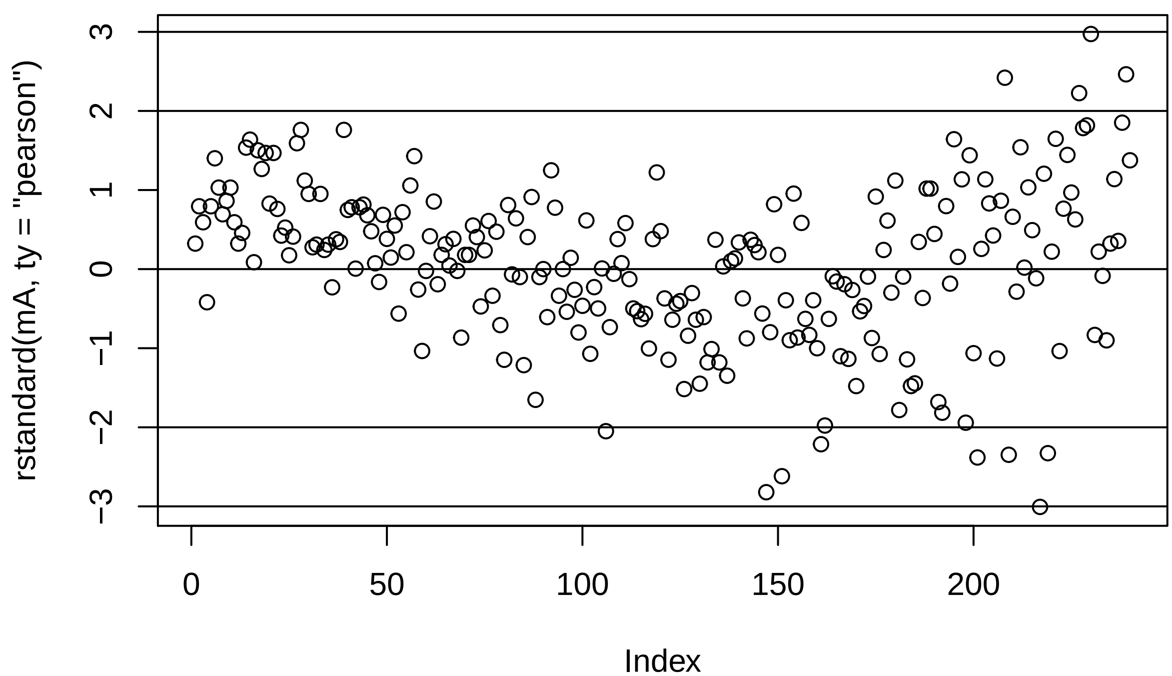
```r
write("Ap: 2","")
```

```
## Ap: 2
```

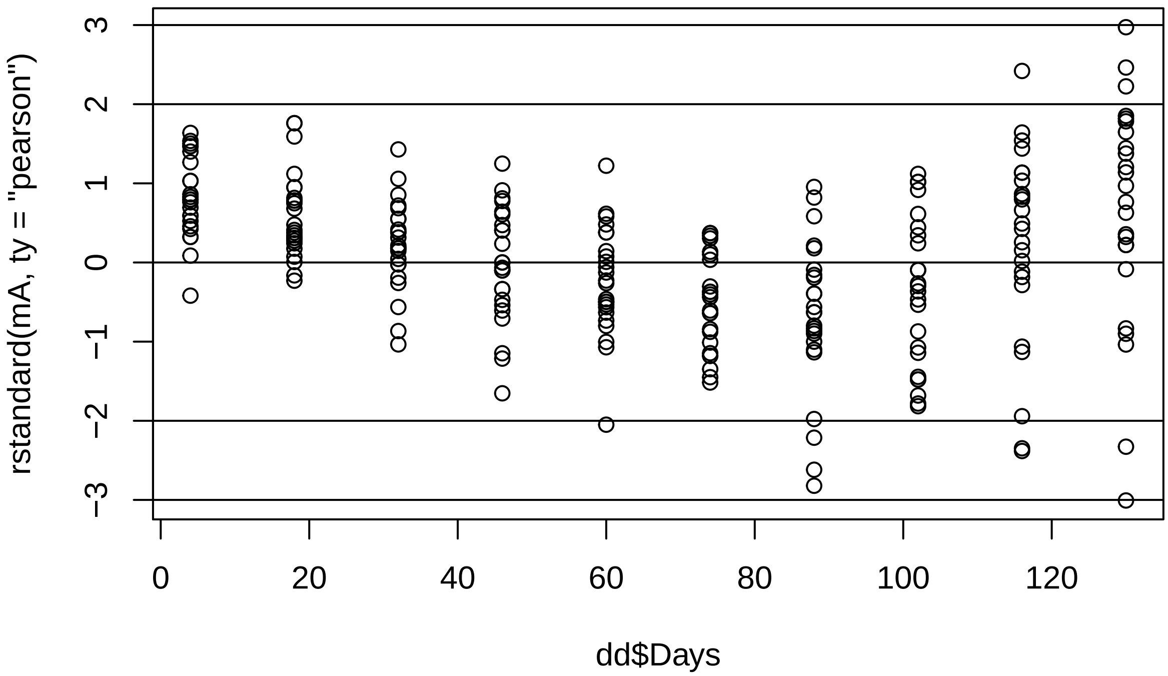
```r
residualPlot(mA, smooth=F)
```




```r
plot(rstandard(mA, ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```r
plot(dd$Days, rstandard(mA, ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```
write("Ap: 3","")
```

```
## Ap: 3
```

```
mfA <- glm(H ~ Days + FDays,
           family=gaussian(link="sqrt"),
           data = dd)
amA <- print(anova(mA, mfA, test="F"))
```

```
## Analysis of Deviance Table
##
## Model 1: H ~ Days
## Model 2: H ~ Days + FDays
##   Resid. Df Resid. Dev Df Deviance      F    Pr(>F)
## 1       238     2105.4
## 2       230     1575.0  8   530.46 9.6833 1.466e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
print(Anova(mfA, test="F"))
```

```
## Analysis of Deviance Table (Type II tests)
##
## Response: H
## Error estimate based on Pearson residuals
##
##            Sum Sq  Df F value    Pr(>F)
## Days                0
## FDays      530.46   8  9.6833 1.466e-11 ***
## Residuals 1574.96 230
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

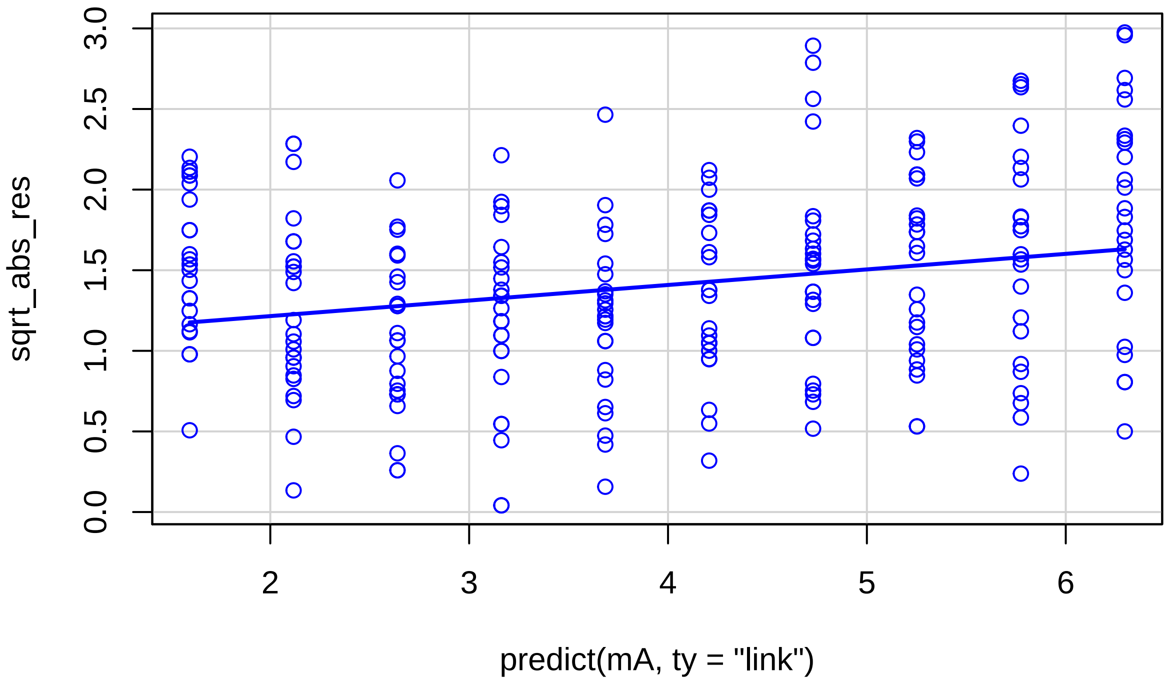
```
write("Ap: 4","")
```

```
## Ap: 4
```

```
print("Var=constant")
```

```
## [1] "Var=constant"
```

```
sqrt_abs_res <- sqrt(abs(residuals.glm(mA,ty="pearson")))
sp(sqrt_abs_res ~ predict(mA,ty="link"),
   boxplot=F,
   smooth=F)
```




```
print(lmA<-leveneTest(residuals(mA,ty="pearson") ~ FDays))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   9  4.4376 2.254e-05 ***
##       230
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#5
customDays <- data.frame(Days=c(0,105,150))
predA <- predict(mA, customDays, ty="response")
standevA <- sqrt(mA$deviance/mA$df.residual)

print(mmA<-cbind(mu = predA,
                 sd = standevA))
```

```
##          mu       sd
## 1  2.088921 2.974279
## 2 28.770890 2.974279
## 3 49.607013 2.974279
```

```r
write("ModB","")
```

```
## ModB
```

```r
write("Ap: 1","")
```

```
## Ap: 1
```

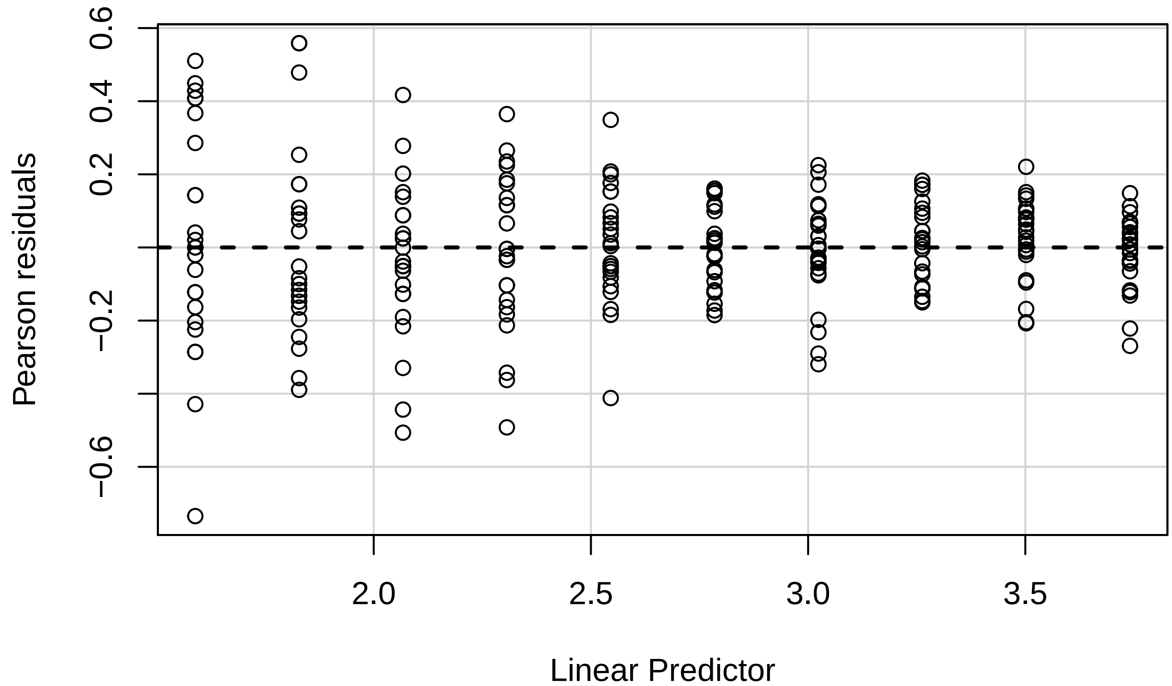
```r
print(summary(mB <- glm(H ~ Days,
                        family = Gamma(link="log"),
                        data = dd) ))
```

```
##
## Call:
## glm(formula = H ~ Days, family = Gamma(link = "log"), data = dd)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -1.08825  -0.11332   0.00146   0.10253   0.47925
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.5208790  0.0231966   65.56   <2e-16 ***
## Days        0.0170784  0.0002969   57.53   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for Gamma family taken to be 0.03419909)
##
##     Null deviance: 117.5399  on 239  degrees of freedom
## Residual deviance:   9.0804  on 238  degrees of freedom
## AIC: 1172.9
##
## Number of Fisher Scoring iterations: 4
```

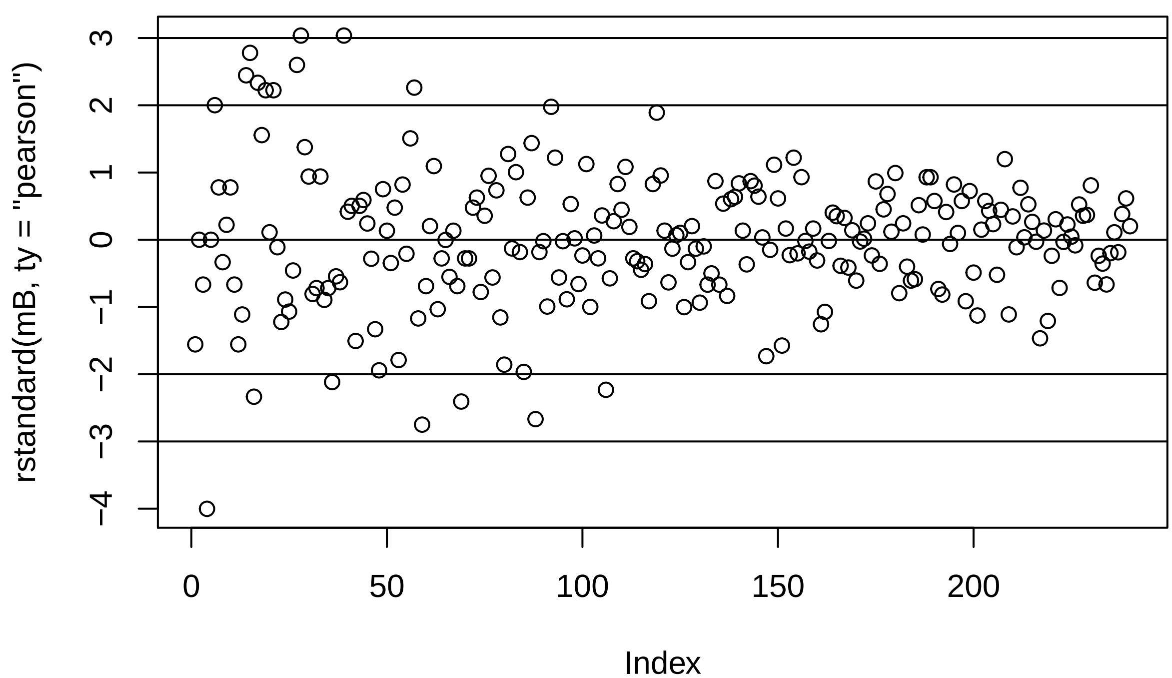
```r
write("Ap: 2","")
```

```
## Ap: 2
```

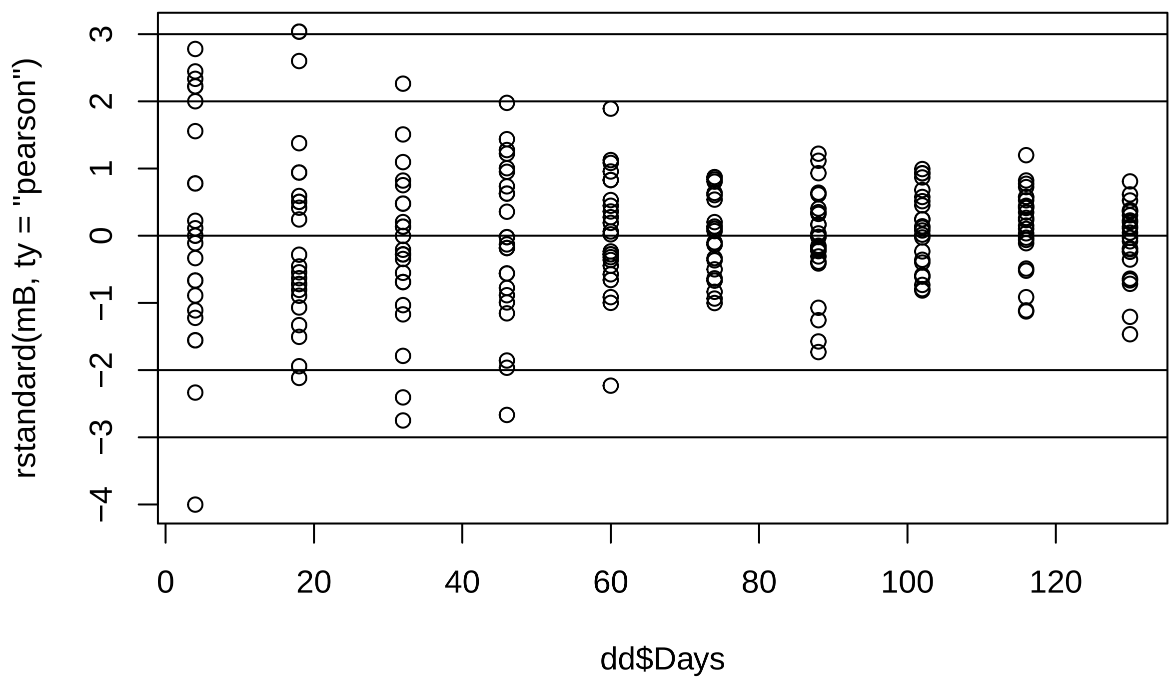
```r
residualPlot(mB, smooth=F)
```




```
plot(rstandard(mB,ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```
plot(dd$Days,rstandard(mB,ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```r
write("Ap: 3","")
```

```
## Ap: 3
```

```r
mfB<-glm(H ~ Days + FDays,
         family = Gamma(link="log"),
         data = dd)

print(amB <- anova(mB, mfB, test="F"))
```

```
## Analysis of Deviance Table
##
## Model 1: H ~ Days
## Model 2: H ~ Days + FDays
##   Resid. Df Resid. Dev Df Deviance      F Pr(>F)
## 1       238     9.0804
## 2       230     9.0009  8 0.079483 0.2847 0.9706
```

```r
print(Anova(mfB, test="F"))
```

```
## Analysis of Deviance Table (Type II tests)
##
## Response: H
## Error estimate based on Pearson residuals
##
##           Sum Sq  Df F value Pr(>F)
## Days               0
## FDays     0.0795   8  0.2847 0.9706
## Residuals 8.0255 230
```

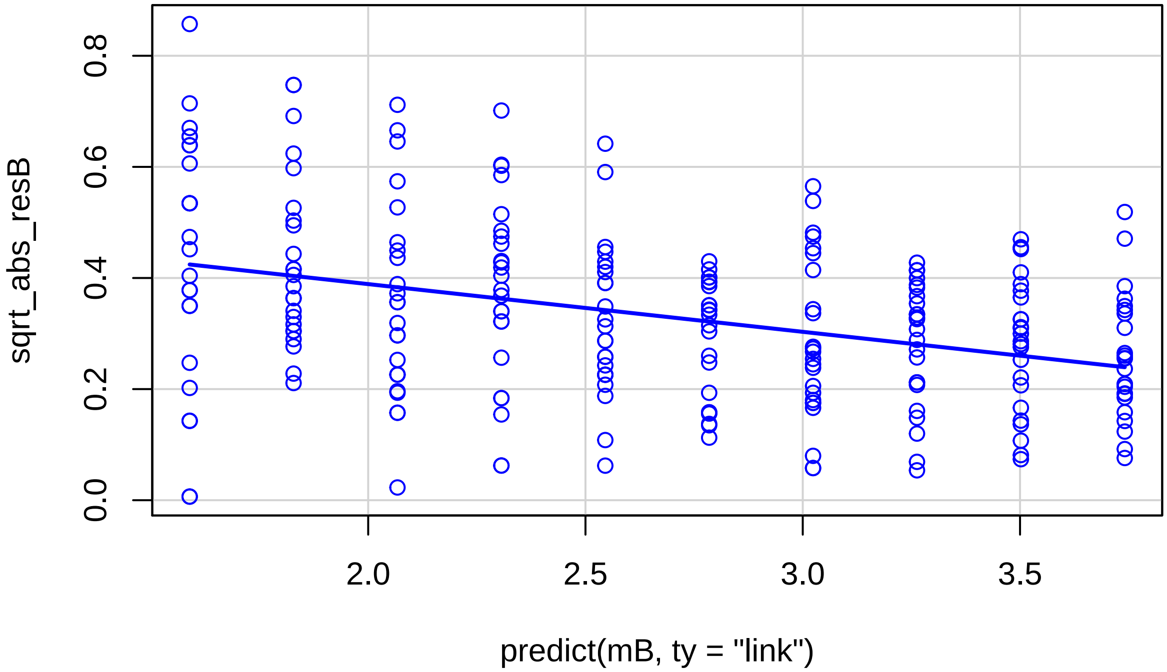
```r
write("Ap: 4","")
```

```
## Ap: 4
```

```r
print("Var=mu^2")
```

```
## [1] "Var=mu^2"
```

```r
sqrt_abs_resB <- sqrt(abs(residuals.glm(mB,ty="pearson")))
sp(sqrt_abs_resB ~ predict(mB,ty="link"),
   boxplot=F,
   smooth=F)
```




```r
print(lmB <- leveneTest(residuals(mB,ty="pearson") ~ FDays))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value    Pr(>F)
## group   9  5.5279 6.816e-07 ***
##       230
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
#5
customDays <- data.frame(Days=c(0,105,150))
predB <- predict(mB, customDays, ty="response")
standevB <- sqrt(predB^2 * sqrt(mB$deviance/mB$df.residual))

print(mmB <- cbind(mu = predB,
                   sd = standevB))
```

```
##          mu        sd
## 1  4.576246  2.022513
## 2 27.497936 12.152960
## 3 59.301755 26.208944
```

```r
write("ModC","")
```

```
## ModC
```

```r
write("Ap: 1","")
```

```
## Ap: 1
```

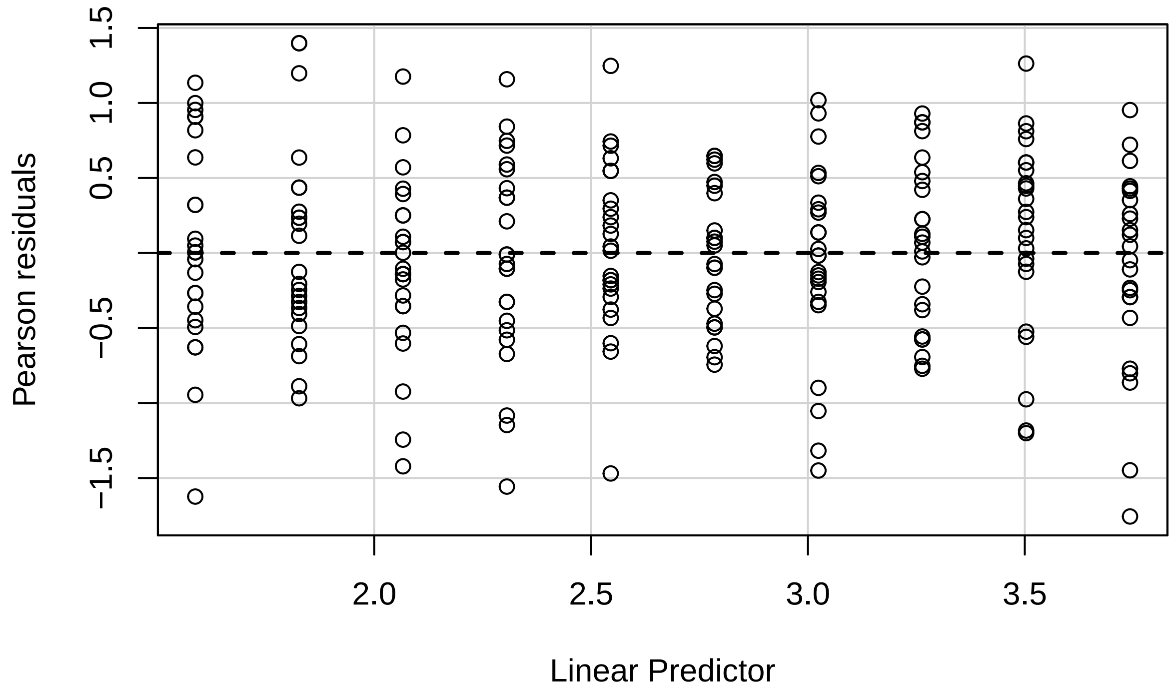
```r
print(summary(mC <- glm(H ~ Days,
                        family = quasi(link=log, var="mu"),
                        data = dd) ))
```

```
##
## Call:
## glm(formula = H ~ Days, family = quasi(link = log, var = "mu"),
##     data = dd)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.9329  -0.3635   0.0074   0.4238   1.2912
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.5188844  0.0261450   58.09   <2e-16 ***
## Days        0.0171060  0.0002647   64.63   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for quasi family taken to be 0.3746782)
##
##     Null deviance: 1880.308  on 239  degrees of freedom
## Residual deviance:   91.949  on 238  degrees of freedom
## AIC: NA
##
## Number of Fisher Scoring iterations: 4
```

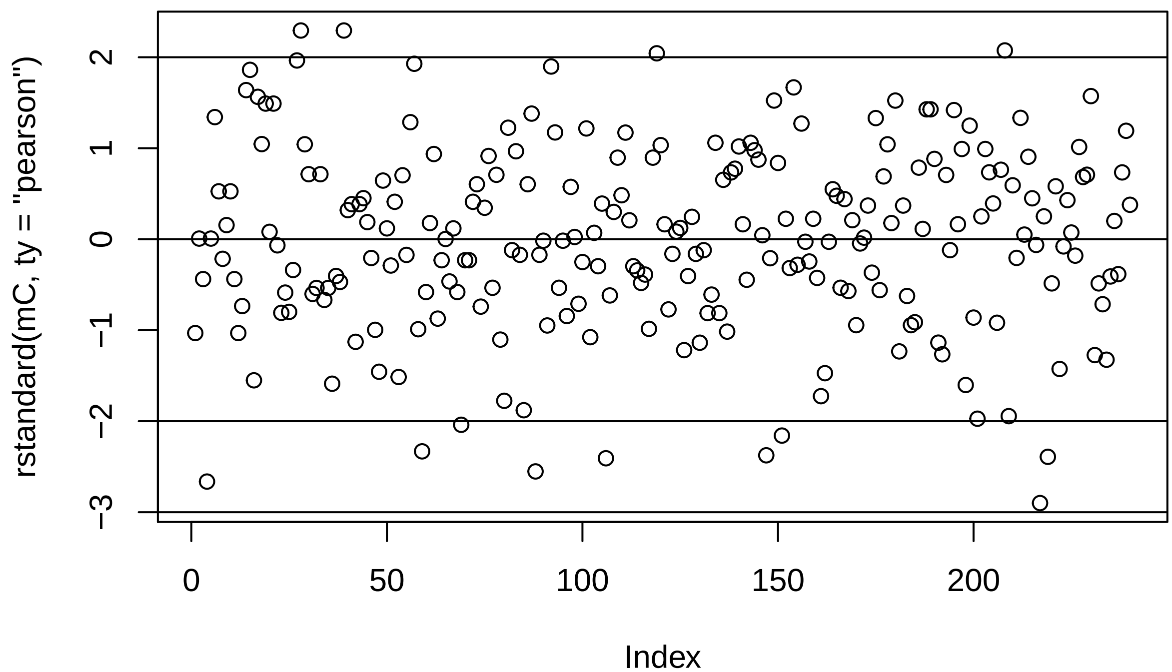
```r
write("Ap: 2","")
```

```
## Ap: 2
```

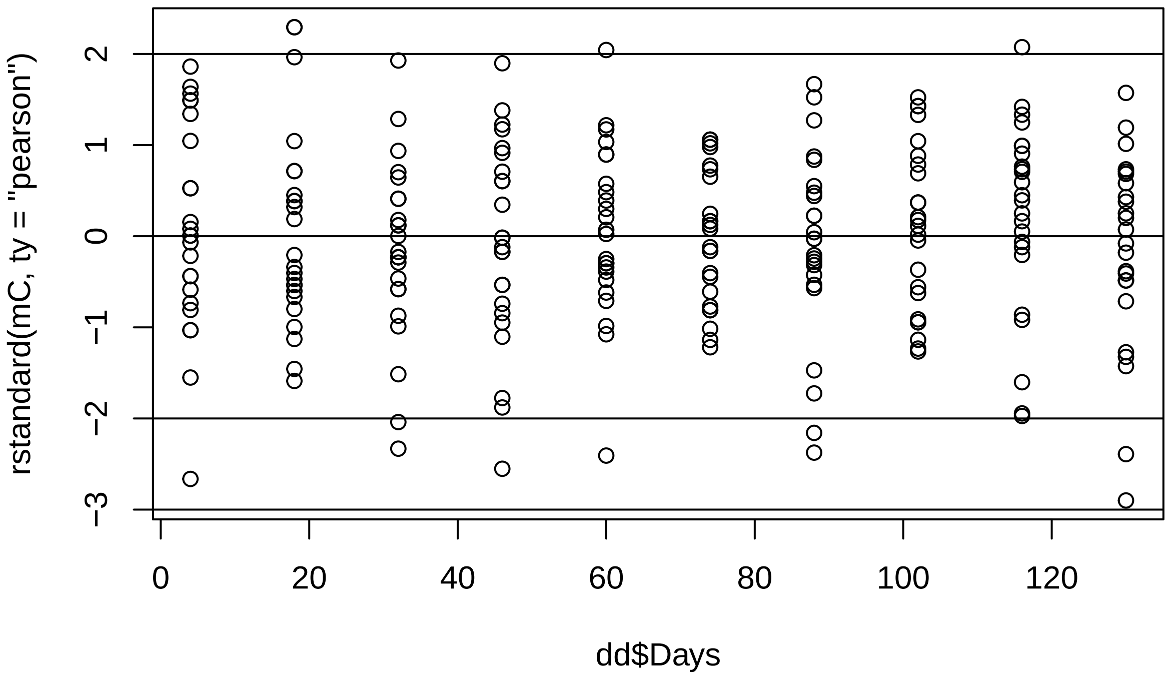
```r
residualPlot(mC, smooth=F)
```




```
plot(rstandard(mC, ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```
plot(dd$Days, rstandard(mC,ty="pearson"))
abline(h=c(-3,-2,0,2,3))
```




```
write("Ap: 3","")
```

```
## Ap: 3
```

```
mfC<-glm(H ~ Days + FDays,
         family=inverse.gaussian(link=log),
         data = dd)
print(amC <- anova(mC, mfC, test="F"))
```

```
## Analysis of Deviance Table
##
## Model 1: H ~ Days
## Model 2: H ~ Days + FDays
##   Resid. Df Resid. Dev Df Deviance      F    Pr(>F)
## 1       238     91.949
## 2       230      1.426  8   90.523 2494.5 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
print(Anova(mfC, test="F"))
```

```
## Analysis of Deviance Table (Type II tests)
##
## Response: H
## Error estimate based on Pearson residuals
##
##             Sum Sq  Df F value Pr(>F)
## Days                 0
## FDays      0.00783   8  0.2157 0.9879
## Residuals 1.04331 230
```

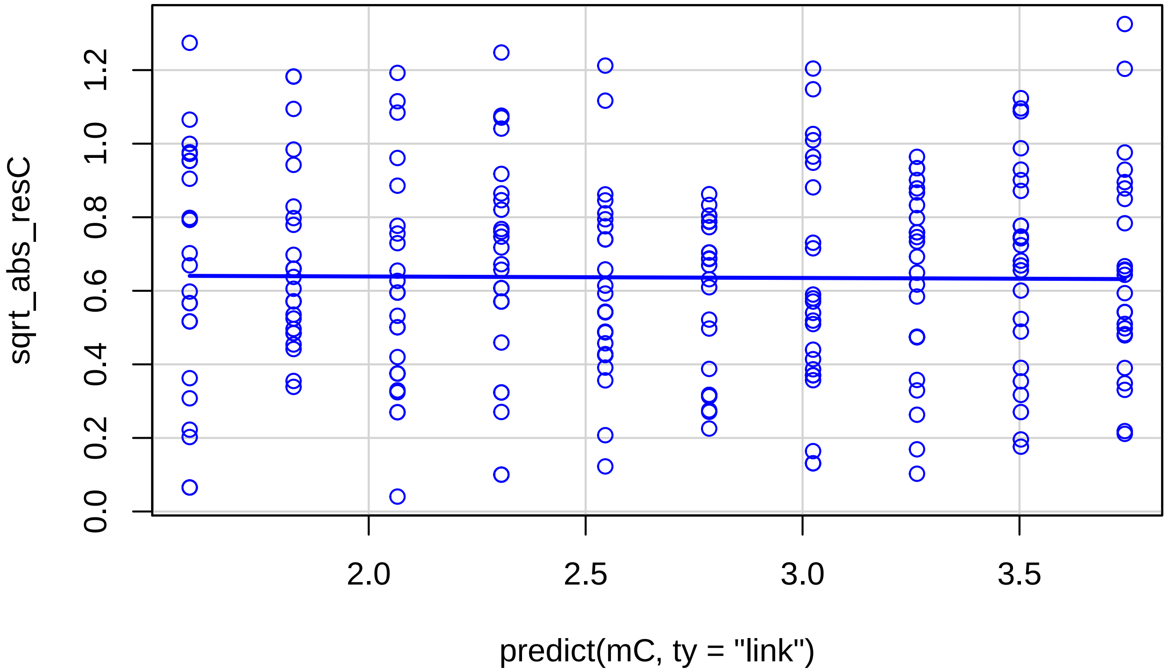
```
write("Ap: 4","")
```

```
## Ap: 4
```

```r
print("Var=mu")
```

```
## [1] "Var=mu"
```

```r
sqrt_abs_resC <- sqrt(abs(residuals.glm(mC,ty="pearson")))
sp(sqrt_abs_resC ~ predict(mC,ty="link"),
   boxplot=F,
   smooth=F)
```




```r
print(lmC <- leveneTest(residuals(mC,ty="pearson") ~ FDays))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##        Df F value Pr(>F)
## group   9  0.4234 0.9218
##       230
```

```r
#5
customDays <- data.frame(Days=c(0,105,150))
predC <- predict(mC, customDays, ty="response") # mu
standevC <- sqrt(predC * mC$deviance/mC$df.residual) # sd

print(mmC <- cbind(mu = predC,
                   sd = standevC))
```

```
##          mu       sd
## 1  4.567127 1.328332
## 2 27.522912 3.260861
## 3 59.429497 4.791661
```

```r
write("Ap 6","")
```

```
## Ap 6
```

```r
RSS_A <- mA$deviance
TSS_A <- mA$null.deviance
```

```r
RSS_B <- mB$deviance
TSS_B <- mB$null.deviance

RSS_C <- mC$deviance
TSS_C <- mC$null.deviance

print(rbind(logLik = c(modA = logLik(mA),
                       modB = logLik(mB),
                       modC = logLik(mC)),
            AIC = c(AIC(mA),
                    AIC(mB),
                    AIC(mC)),
            "R2" = c(1-RSS_A/TSS_A, 1-RSS_B/TSS_B, 1-RSS_C/TSS_C),
            "p-valor test Ap3" = c(amA[2,6],amB[2,6],amC[2,6]),
            "p-valor Test Levene" = c(lmA[1,3],lmB[1,3],lmC[1,3])))
```

```
##                              modA          modB          modC
## logLik              -6.011415e+02 -5.834508e+02            NA
## AIC                  1.208283e+03  1.172902e+03            NA
## R2                   9.399405e-01  9.227463e-01  9.510990e-01
## p-valor test Ap3     1.465739e-11  9.705615e-01 8.500626e-219
## p-valor Test Levene  2.253624e-05  6.816144e-07  9.218213e-01
```

```r
mms<-cbind(mmA,mmA,mmB,mmC)[,c(1,3,5,7,2,4,6,8)]
colnames(mms)<-c("fit","fitA","fitB","fitC","sd","sdA","sdB","sdC")
rownames(mms)<-c("dia 0","dia 105","dia 150")
print(mms[,1:4])
```

```
##               fit      fitA      fitB      fitC
## dia 0    2.088921  2.088921  4.576246  4.567127
## dia 105 28.770890 28.770890 27.497936 27.522912
## dia 150 49.607013 49.607013 59.301755 59.429497
```

```r
print(mms[,5:8])
```

```
##               sd      sdA       sdB      sdC
## dia 0   2.974279 2.974279  2.022513 1.328332
## dia 105 2.974279 2.974279 12.152960 3.260861
## dia 150 2.974279 2.974279 26.208944 4.791661
```