Assignment 6

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1

```
geriatric <- read.table(file='~/Documents/uni/STAT359/data/geriatric.txt',
                        header=TRUE, sep='')
```

a)

```
mod1 <-glm(Fall~exp(Int)+exp(Sex)+exp(BI)+exp(SI),
           data=geriatric, family=poisson)
summary(mod1)
```

```
##
## Call:
## glm(formula = Fall ~ exp(Int) + exp(Sex) + exp(BI) + exp(SI),
##     family = poisson, data = geriatric)
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.187e+00  1.668e-01  13.110  < 2e-16 ***
## exp(Int)    -5.973e-01  7.800e-02  -7.657  1.9e-14 ***
## exp(Sex)    -5.921e-02  6.986e-02  -0.848    0.397
## exp(BI)      1.424e-43  1.073e-43   1.327    0.185
## exp(SI)      2.263e-40  3.204e-40   0.706    0.480
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for poisson family taken to be 1)
##
##     Null deviance: 199.19  on 99  degrees of freedom
## Residual deviance: 121.39  on 95  degrees of freedom
## AIC: 389.88
##
## Number of Fisher Scoring iterations: 5
```

b)

```
deviance(mod1)
```

```
## [1] 121.3859
```

```
mod1$df.residual
```

```
## [1] 95
```

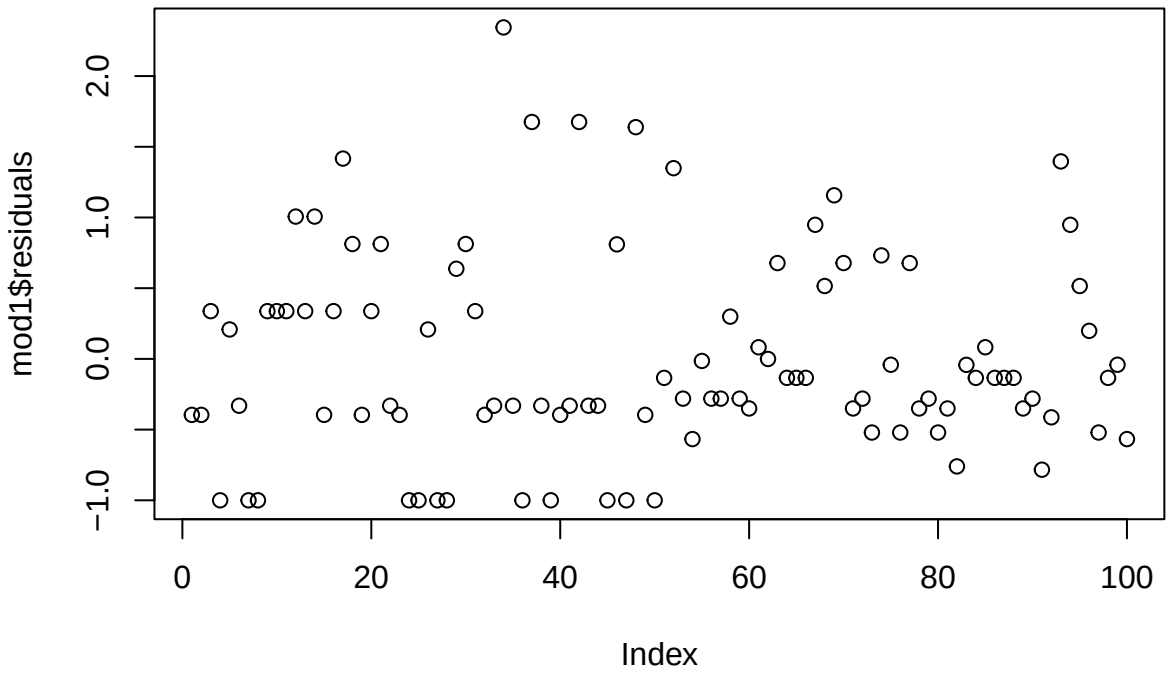
```
1-pchisq(deviance(mod1), mod1$df.residual)
```

```
## [1] 0.03526469
```

The p-value is ≈ 0.035, meaning there is evidence that this model is adequate for this data.

c)

```
plot(mod1$residuals)
```



While most points stay within the range $[-1, 2]$, point 34 does appear greater than the rest.

```
mod1$residuals[34]
```

```
##       34
## 2.344157
```

While this point does stand out, it isn't far out of the range of the other values, so it may not have a significant impact.

d)

```
mod2 <- update(mod1, .~. - exp(Sex))
anova(mod1, mod2, test="Chi")
```

```
## Analysis of Deviance Table
##
## Model 1: Fall ~ exp(Int) + exp(Sex) + exp(BI) + exp(SI)
## Model 2: Fall ~ exp(Int) + exp(BI) + exp(SI)
##   Resid. Df Resid. Dev Df Deviance Pr(>Chi)
## 1        95     121.39
## 2        96     122.11 -1 -0.71962   0.3963
```

In this case, we have no evidence that a model without sex peforms any better than the model that includes it.

e)

```
summary(mod2)
```

```
##
## Call:
## glm(formula = Fall ~ exp(Int) + exp(BI) + exp(SI), family = poisson,
##     data = geriatric)
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.094e+00  1.273e-01  16.452  < 2e-16 ***
## exp(Int)    -6.079e-01  7.700e-02  -7.895 2.91e-15 ***
## exp(BI)      1.265e-43  1.056e-43   1.198    0.231
## exp(SI)      2.726e-40  3.148e-40   0.866    0.386
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for poisson family taken to be 1)
##
##     Null deviance: 199.19  on 99  degrees of freedom
## Residual deviance: 122.11  on 96  degrees of freedom
## AIC: 388.6
##
## Number of Fisher Scoring iterations: 5
```

```
confint(mod2, "exp(Int)")
```

```
## Waiting for profiling to be done...
```

```
##      2.5 %     97.5 %
## -0.7620548 -0.4597721
```

According to this confidence interval, intervention will reduce the average number of falls by between 0.4 and 0.7.

f)

We have reason to believe that aerobic education and exercise do lead to a reduction of falls, even after taking into account both balance and strength.