Archosaurs: Linear Regression Example

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Read data from SAS input file

```
# this data came from SASHELP.CARS
brain <- read.csv('archosaur.csv', header = TRUE)
summary(brain)
```

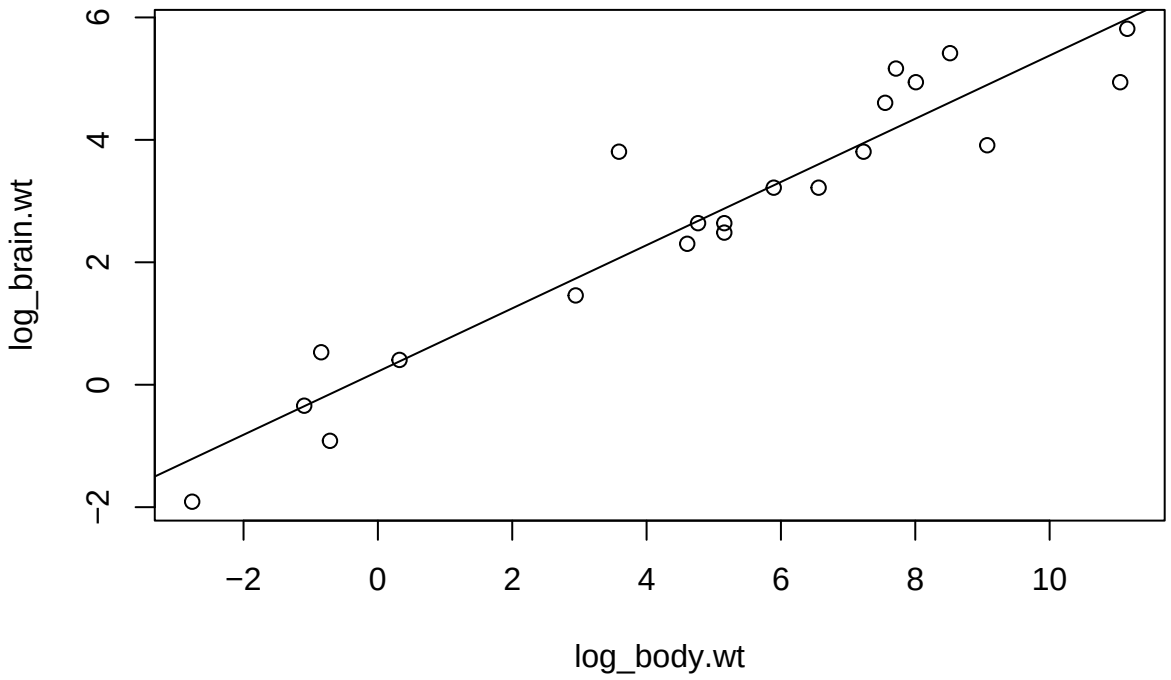
```
##      Type              Details           Body.Weight        Brain.Weight
##  Length:21          Length:21          Min.   :    0.06   Min.   :  0.148
##  Class :character   Class :character   1st Qu.:   19.00   1st Qu.:  4.300
##  Mode  :character   Mode  :character   Median :  173.60   Median : 25.000
##                                        Mean   : 7472.37   Mean   : 64.941
##                                        3rd Qu.: 2236.00   3rd Qu.:100.000
##                                        Max.   :70000.00   Max.   :335.000
```

Transform Data

```
log_body.wt = log(brain$Body.Weight)
log_brain.wt = log(brain$Brain.Weight)
```

Graph of data

```
plot(log_brain.wt~log_body.wt)
abline(lm(log_brain.wt~log_body.wt))
```

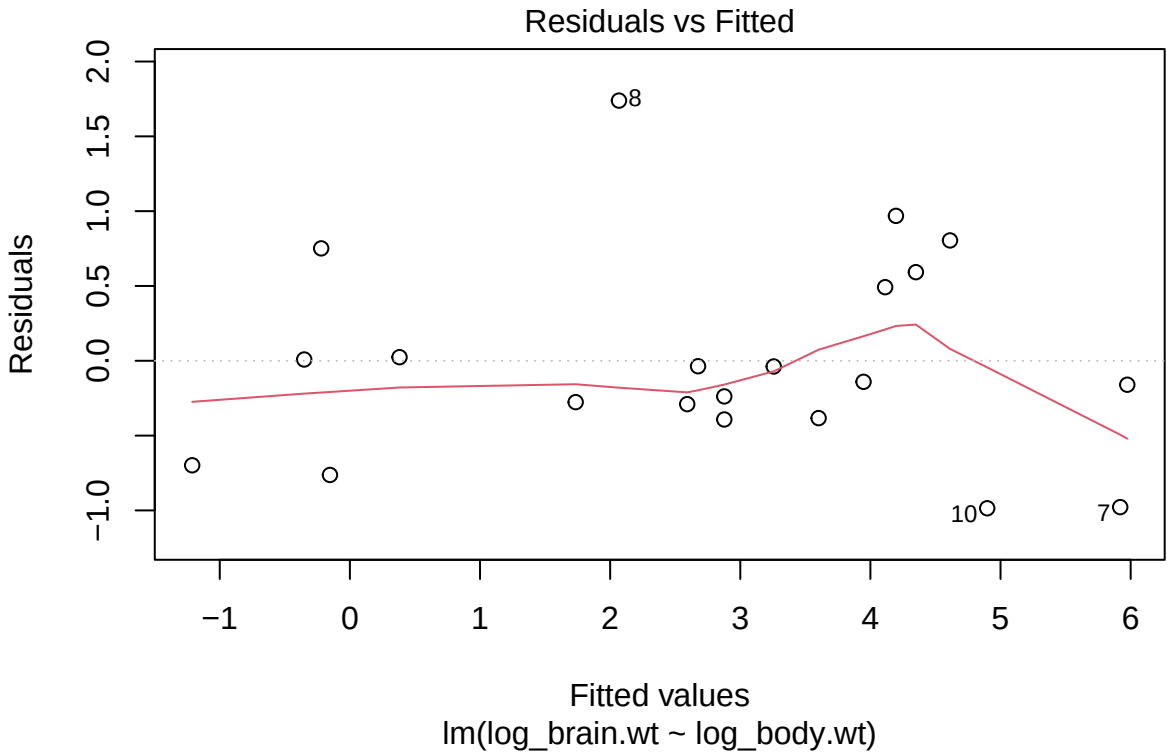


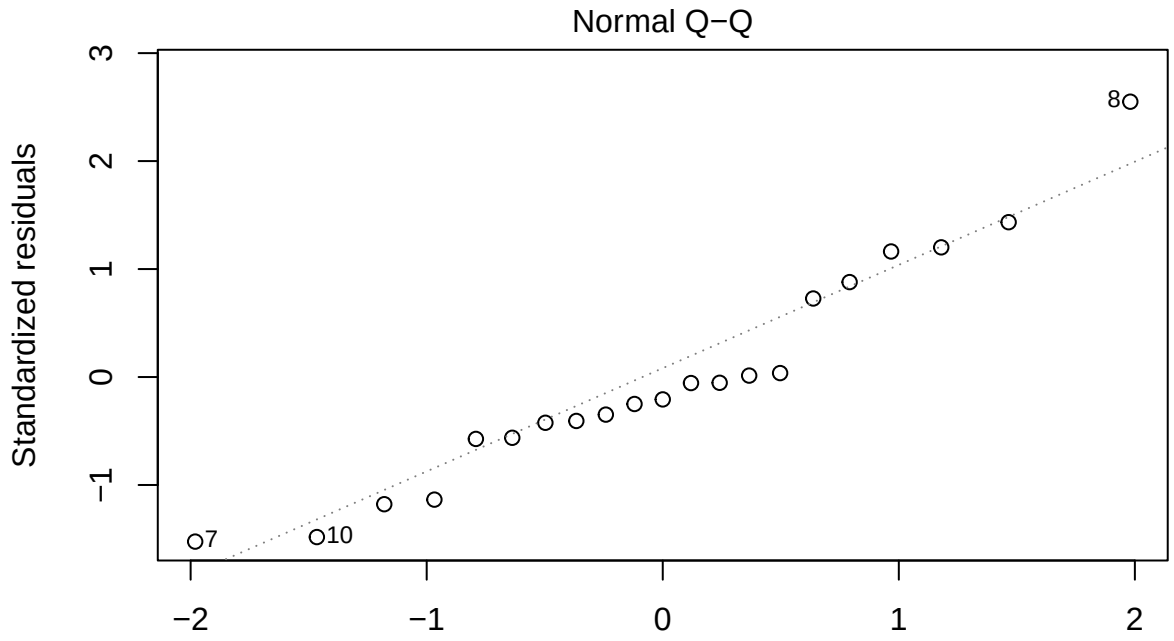
Results

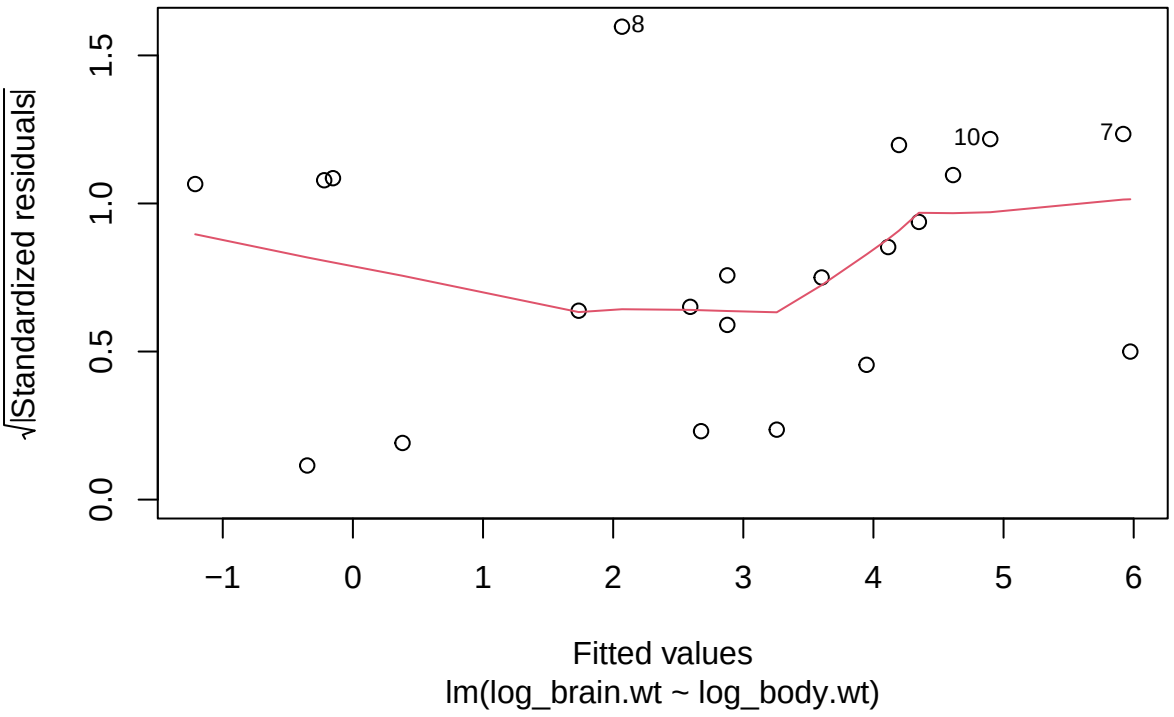
```
result<-lm(log_brain.wt~log_body.wt)
summary(result)
```

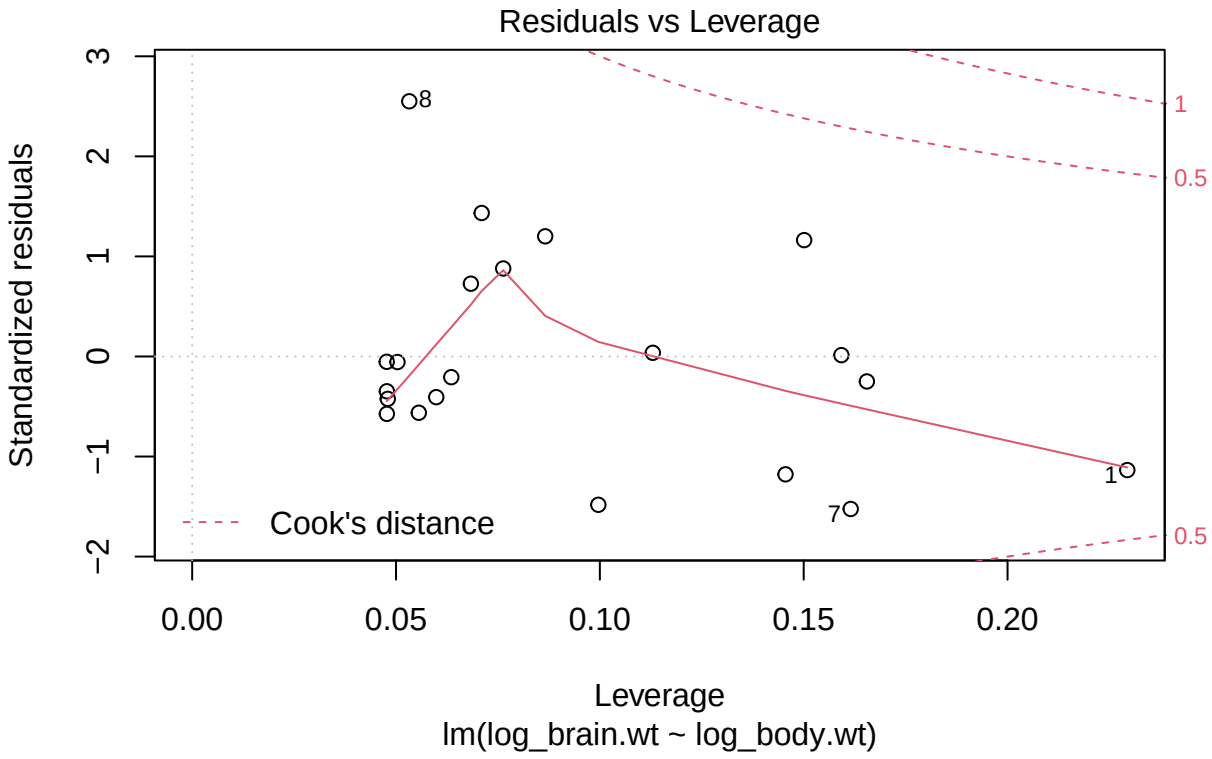
```
##
## Call:
## lm(formula = log_brain.wt ~ log_body.wt)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.9856 -0.3831 -0.1405  0.4919  1.7389
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.21507    0.24518   0.877    0.391
## log_body.wt  0.51621    0.03874  13.324 4.34e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7008 on 19 degrees of freedom
## Multiple R-squared:  0.9033, Adjusted R-squared:  0.8982
## F-statistic: 177.5 on 1 and 19 DF,  p-value: 4.341e-11
```

```
plot(result)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(log_brain.wt ~ log_body.wt)
8
7
10


Scale−Location
√|Standardized residuals|
Fitted values
lm(log_brain.wt ~ log_body.wt)
8
10
7


Residuals vs Leverage
Standardized residuals
3
2
1
0
−1
−2
8
1
7
1
0.5
0.5
Cook's distance
0.00
0.05
0.10
0.15
0.20
Leverage
lm(log_brain.wt ~ log_body.wt)