1 mtcars example

*Several data sets , intended as learning tools, are automatically installed when R is installed. Many more are installed within packages to complement learning to use those packages. One of these is the famous **mtcars** data set, which is used in many data mining exercises.*

```
> data(mtcars)
> head(mtcars)
                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

Suppose we fit a model with *mpg* (miles per gallon) as the response variable and *cyl* and *wt* (number of cylinders and weight of the car) as the predictor variables. We will call this fitted model `fit`.

```
fit <- lm(mpg ~ cyl + wt, data=mtcars)
```

```
> summary(fit)

Call:
lm(formula = mpg ~ cyl + wt, data = mtcars)

Residuals:
Min      1Q  Median      3Q      Max
-4.2893 -1.5512 -0.4684  1.5743  6.1004

Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept)  39.6863      1.7150  23.141  < 2e-16 ***
cyl          -1.5078      0.4147  -3.636 0.001064 **
wt           -3.1910      0.7569  -4.216 0.000222 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Residual standard error: 2.568 on 29 degrees of freedom
Multiple R-squared:  0.8302,    Adjusted R-squared:  0.8185
F-statistic: 70.91 on 2 and 29 DF,  p-value: 6.809e-12
```
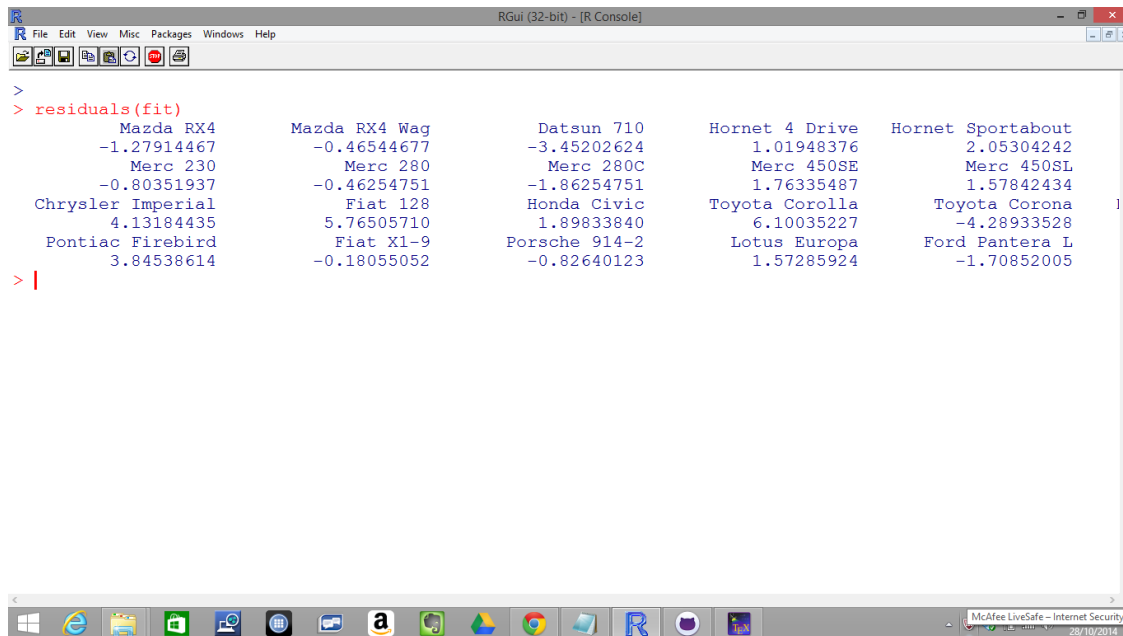
```
residuals(fit1)
```


Figure 1:

```
> sum(residuals(fit))
[1] 1.096345e-15


> #Shapiro-Wilk Test for Normality
> shapiro.test(resid(fit))

 Shapiro-Wilk normality test

 data:  resid(fit)
 W = 0.9375, p-value = 0.06341
```