

Porsche prices

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references:

- Cannon, et al., Stat2, chapter 01, examples 1.1-1.5

- [Porsche](#)

Import the data.

```
data <- read.csv("PorschePrice.csv", header=TRUE)
head(data, 4)
```

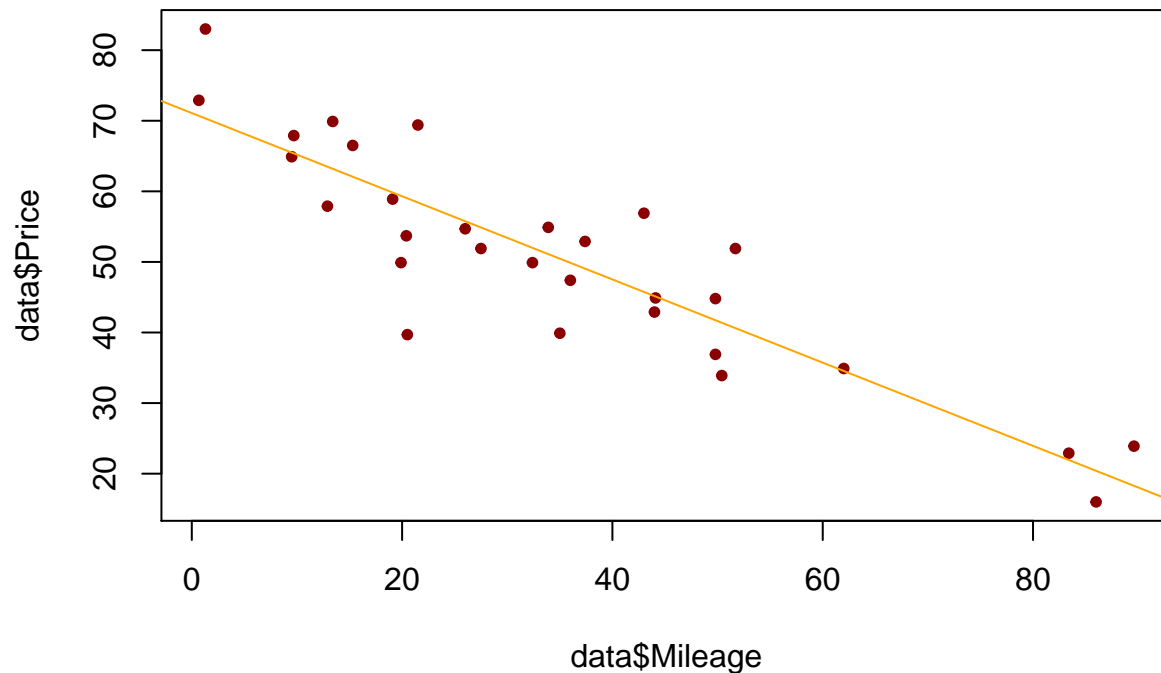
```
##   Price Age Mileage
## 1  69.4   3   21.5
## 2  56.9   3   43.0
## 3  49.9   2   19.9
## 4  47.4   4   36.0
```

```
dim(data)
```

```
## [1] 30  3
```

View the data.

```
plot(data$Mileage, data$Price,
      pch=20, col="darkred")
Porsche.lm <- lm(Price ~ Mileage, data=data)
abline(Porsche.lm, col="orange")
```



Linear model.

$$\widehat{price} = 71.09 + -0.589 \text{ mileage}$$

```
options(show.signif.stars=FALSE)
summary(Porsche.lm)
```

```
##
## Call:
## lm(formula = Price ~ Mileage, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -19.3077  -4.0470  -0.3945   3.8374  12.6758
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  71.09045    2.36986   30.0 < 2e-16
## Mileage     -0.58940    0.05665  -10.4 3.98e-11
##
## Residual standard error: 7.17 on 28 degrees of freedom
## Multiple R-squared:  0.7945, Adjusted R-squared:  0.7872
## F-statistic: 108.3 on 1 and 28 DF,  p-value: 3.982e-11
```

```
anova(Porsche.lm)
```

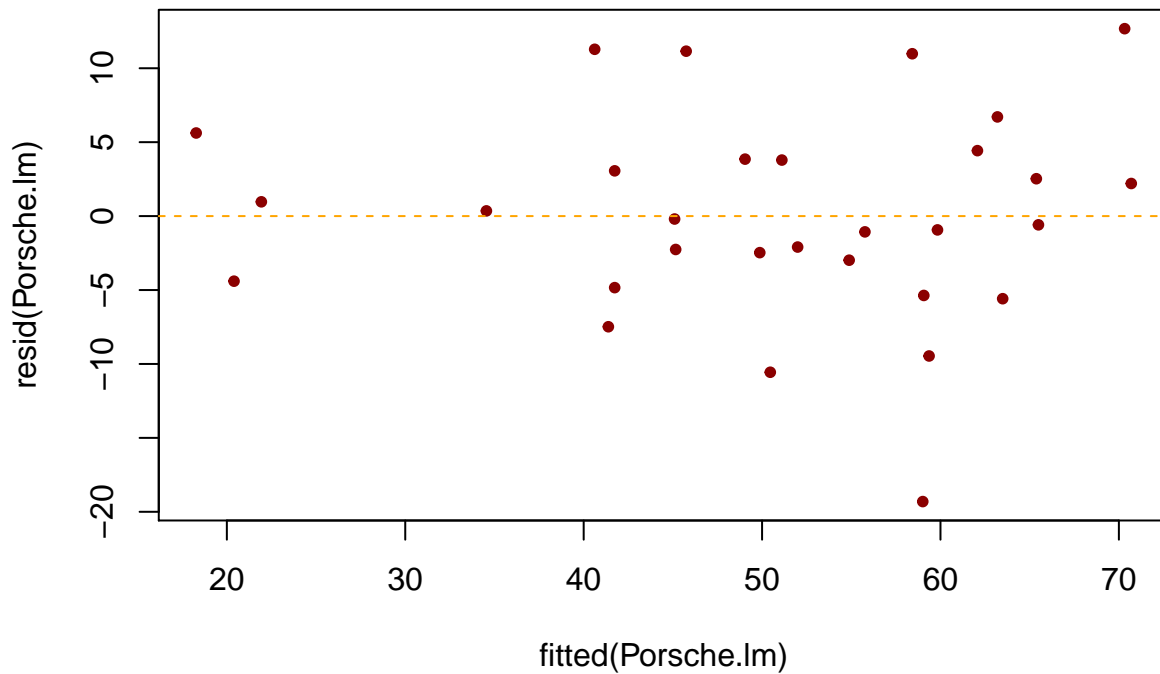
```
## Analysis of Variance Table
##
## Response: Price
##           Df Sum Sq Mean Sq F value    Pr(>F)
## Mileage    1  5565.7  5565.7  108.25 3.982e-11
## Residuals 28  1439.6    51.4
```

Regression (= residual) standard error.

$$\widehat{\sigma}_e = \sqrt{MSE} = 7.169$$

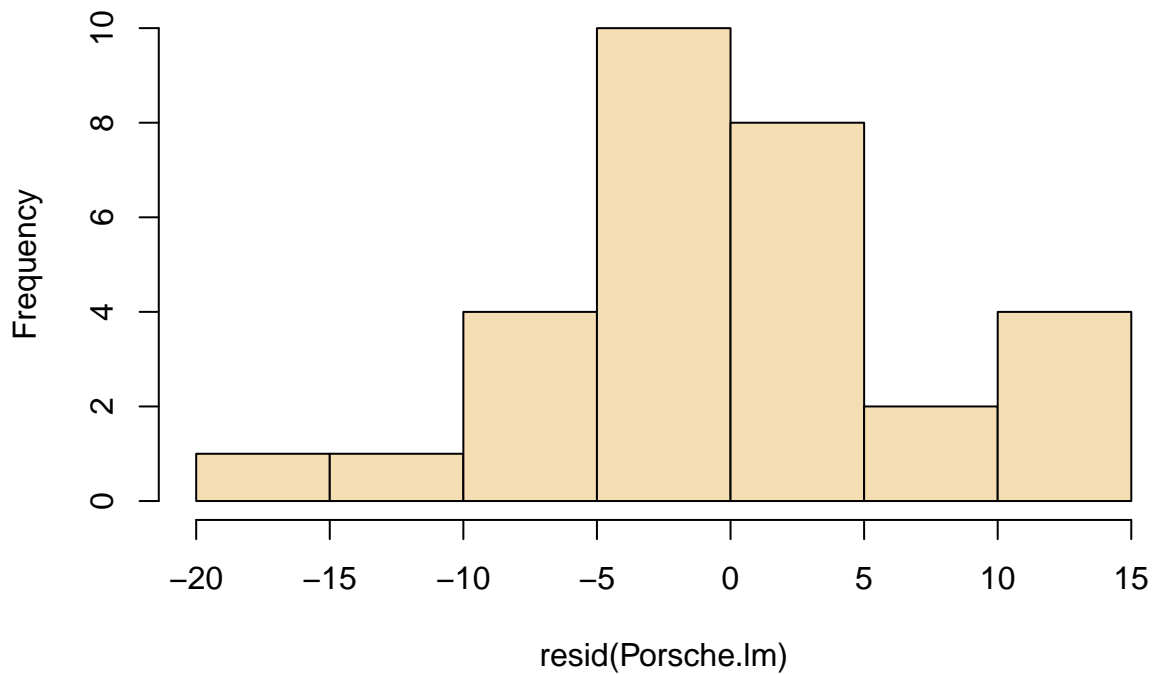
Residuals.

```
plot(fitted(Porsche.lm), resid(Porsche.lm),
     pch=20, col="darkred")
abline(h=0, col="orange", lty="dashed")
```



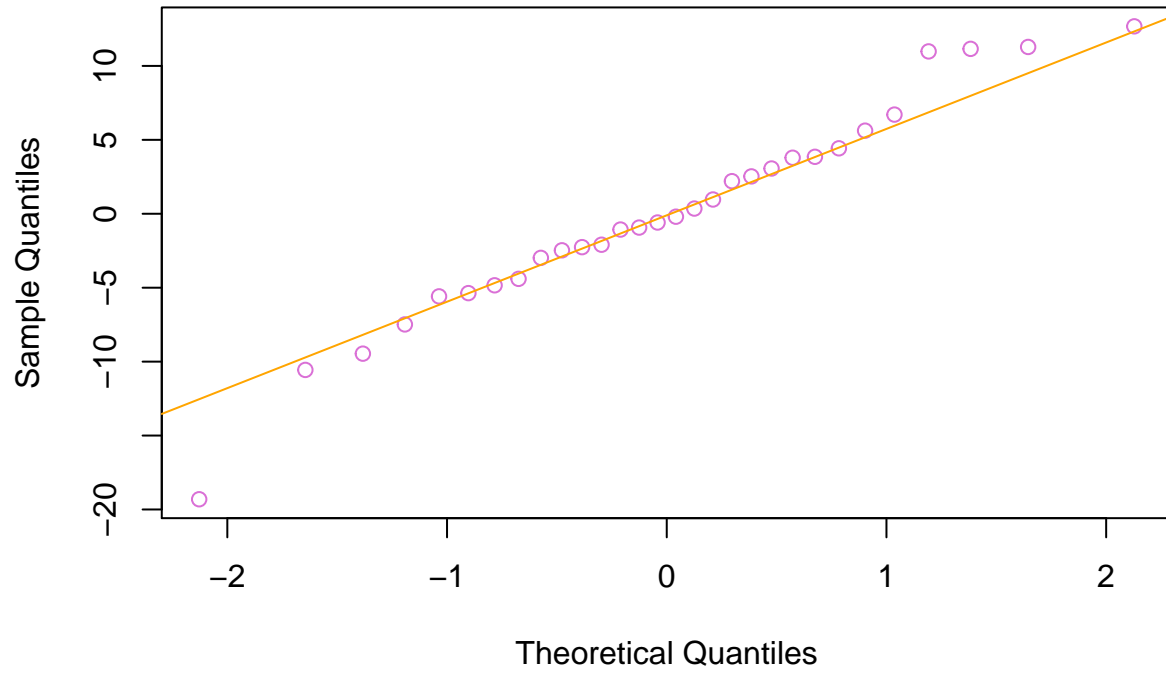
```
hist(resid(Porsche.lm), col="wheat")
```

Histogram of resid(Porsche.lm)



```
qqnorm(resid(Porsche.lm),
        col="orchid")
qqline(resid(Porsche.lm), col="orange")
```

Normal Q-Q Plot



Prediction.

```
new.data <- data.frame(Mileage=50)  
predict(Porsche.lm, new.data)
```

```
##          1  
## 41.62041
```