Assumption of Constant Variance

Homoscedasticity

- **Homoscedascity** is the technical term to describe the variance of the residuals being constant across the range of predicted values.

- **Heteroscedascity** is the converse scenario : the variance differs along the range of values.

Heteroscedascity can be detected by inspecting the scatterplots.
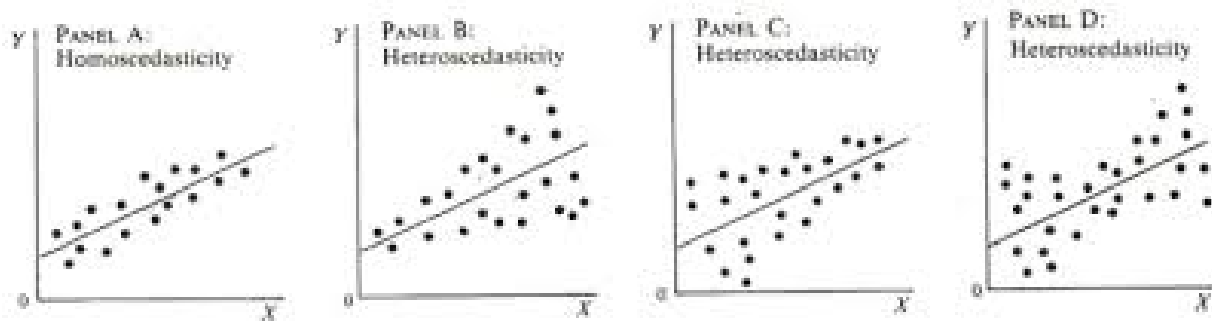

Fig. 9-1

You can also detect heteroscedasciity by inspecting the residual plots.

- Suppose you plot the individual residuals against the predicted value, the variance of the residuals predicted value should be constant.

- Consider the red arrows in the picture below, intended to indicate the variance of the residuals at that part of the number line. For the OLS summption to be valid , the length of the red lines should be more or less the same.
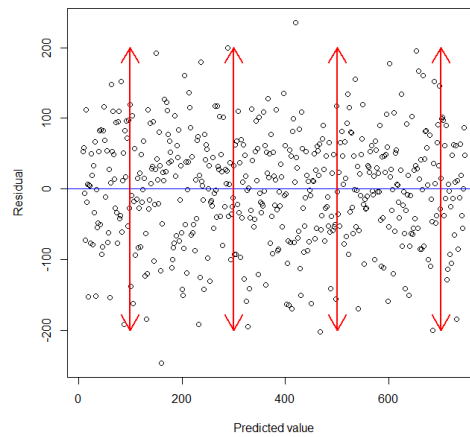
1

Figure 1:

```
># Evaluate homoscedasticity
># non-constant error variance test
> FitAll

Call:
lm(formula = Taste ~ Acetic + H2S + Lactic)

Coefficients:
(Intercept)        Acetic            H2S         Lactic
-28.8768        0.3277         3.9118        19.6705
```

A test for heteroscedascoity canbe carried out using the **car** R package. The null hypothesis is that the residuals display constant variance across the range of values.

```
>library(car)
> ncvTest(FitAll)
Non-constant Variance Score Test
Variance formula: ~ fitted.values
Chisquare = 1.157465     Df = 1      p = 0.2819919
```
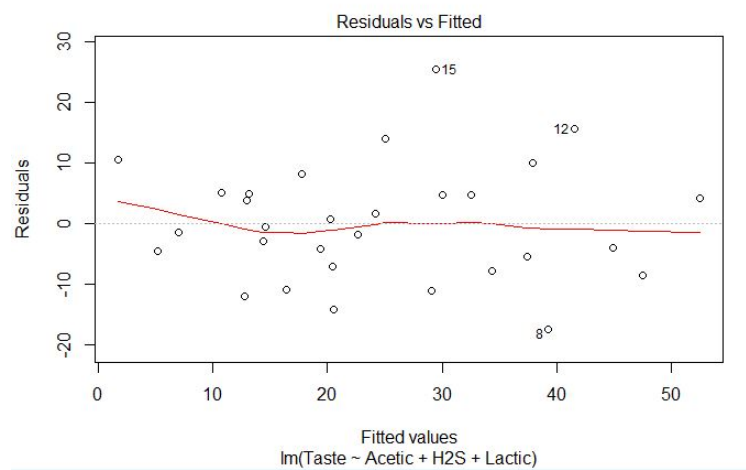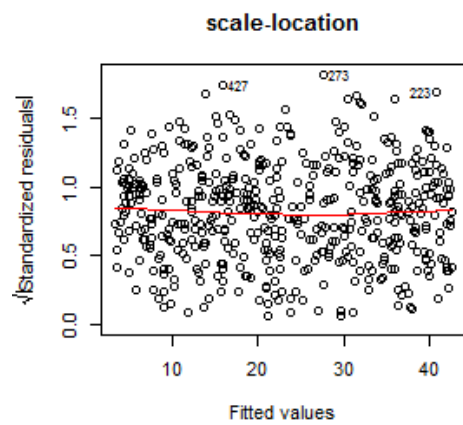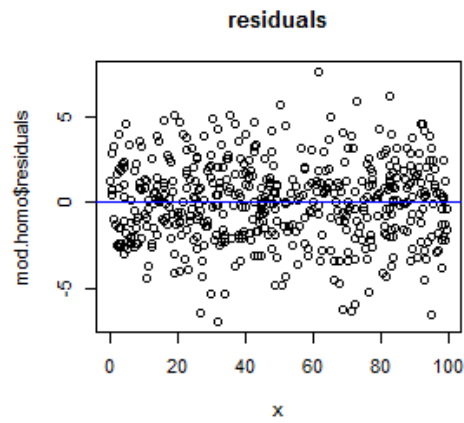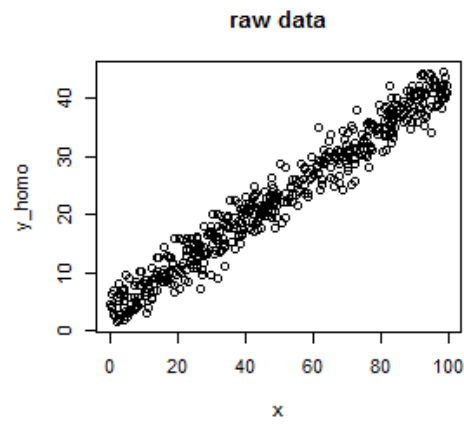

Figure 2:

homoscedastic   heteroscedastic