

Tilastollinen tietojenkäsittely

Exercise 3

7.11.2006

1. Maindonald 3.9.6.
2. Maindonald 3.9.8.
3. Maindonald 3.9.10.
4. Fibonacci series is defined as follows:

$$\begin{cases} a_1 = 1 \\ a_2 = 1 \\ a_{n+2} = a_n + a_{n+1}. \end{cases}$$

Make a function, which calculates the terms a) rekursively b) iteratively.

5. In *wtlos* data (Library MASS) test the degree of polynomial model needed when the dependent variable is *Weight* and the explanatory variable is *Days*. Investigate the distribution of residuals and make the appropriate transformations if needed.
6. Write a function which generates n vectors from the regression model

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\epsilon},$$

where $\boldsymbol{\epsilon} \sim N(\mathbf{0}, \sigma^2 \mathbf{I})$. Number n , \mathbf{X} , $\boldsymbol{\beta}$ and σ^2 should be given as arguments. *Hint: Use `rmnorm()`.*

7. Use your function for $n = 1000$ and for some appropriate choices of \mathbf{X} , $\boldsymbol{\beta}$ and σ^2 . Investigate now the distribution of the estimates $\hat{\boldsymbol{\beta}}$.