

Stat 201 - Generalized Linear Models

Optional Assignment

1. Review the R codes presented in class (look in the directory `R material`). Make sure you understand every command line.
2. Compute the mean and the variance of the following distributions:
 - a Poisson distribution with parameter θ
 - a Binomial distribution with parameters n and p
 - an exponential distribution with parameter λ
3. DB book : exercise 1.5, item (b) and (c).
4. DB book: exercise 1.6 – Use the Newton-Raphson method for item (c). Write the R code.
5. Import the file `birthweight-modified.txt`: it is a modification of the Dobson dataset `birthweight`, obtained by coding gender as a binary variable

$$x_{jk} = \begin{cases} 0 & \text{boy} \\ 1 & \text{girl} \end{cases}.$$

You can use the import facility of R Studio to load the data into your R session. Assume the model

$$y_{jk} \stackrel{\text{ind}}{\sim} N(\mu_{jk}, \sigma^2), j = 1, 2; k = 1 \dots 12$$

$$\mu_{jk} = \beta_0 + \beta_1 x_{jk}$$

- by minimizing the appropriate sum of squares, find the least squares estimates of the parameters β_0 and β_1
- use R to obtain the numeric values of the LS estimates of the parameters and the sum of the squared residuals of the model
- provide a geometric interpretation of these estimates