Analysis of Longitudinal Data SuSe 2017   **Sheet 7**

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This exercise sheet will familiarize you with marginal models for non-normal longitudinal data – in particular with the estimation using generalized estimating equations. The exercises refer to the content of the tenth lecture slides.

Exercise 1: GEE

The data set `leprosylong.txt` contains the number of leprosy bacilli before and after treatment with two different antibiotics. For each patient, the following variables exist: `Drug`, `count` (count of bacilli) and `time`. Drug takes the values A,b and C, where C corresponds to a treatment with placebo. `time = 0` corresponds to the condition before treatment, `time = 1` to the condition after treatment.

(a) Take a look at the data and specify a maginal poisson model for `count` with `time` and `Drug` as covariates.

(b) What does the "generalized" in the name of the estimating equations GEE refer to?

(c) Estimate the marginal model from **(a)** using GEE. Assume that observations on the same patient are not independent. Use an unstructured correlation.
Note: Use the function `gee` included in the package `gee`.

(d) Extract the "naive" and "robust" estimations of the variances of the parameters from the `gee`-object. Explain the different estimation procedures.

(e) In which cases is the robust variance estimation appropriate?