BIOSTATISTICS 667
Homework 5

1. Fit the following generalized mixed model to the SCS Data (chapter 9). Define "group" to be 0 for the placebo patients and 1 for the treated patients. The fixed effects (β) correspond to intercept, time and time by group interaction. Use "time" as a quantitative (continuous) covariate; range 0–6. Allow for subject-specific random intercept and random slope for time. So, $p = 3, q = 2$.

   For consistency in grading the homework, use 25 quadrature points if your software allows it (qpoints=25 in SAS proc nlmixed). Obtain initial values for β by fitting an ordinary logistic regression model, ignoring the correlation. For G, use initial values $g_{11} = 4, g_{21} = 0, g_{22} = 1$.

   Note: Use time, not the square root of time as done in the textbook.

   (a) Report parameter and standard error estimates.

   (b) Interpet the model parameters.

   (c) Based on the model fit, compute the estimated marginal means for a placebo patient at times 0, 3 and 6 weeks and for a treated patient at the same time points.

   (d) Based on the model fit, compute the estimated marginal correlation matrix for a placebo patient at times 0, 3 and 6 weeks.

   (e) Based on the model fit, compute the estimated ICC for a placebo patient at 6 weeks.

   (f) Estimate the population proportion of placebo subjects with a positive subject-specific trend over time (slope for time) (i.e. the probability that the subject-specific slope is > 0). Do the same for the treated subjects. Compute 95% confidence intervals if possible.

   (g) Use the likelihood ratio test to test $H_0 : g_{22} = 0$ against $H_0 : g_{22} > 0$ at the 0.01 level. Describe your approach, methods and results.

   Files: scs*