

Epidemiology III: BMTRY 748
Homework2: Feb 1, 2018

Provide succinct summary and only relevant SAS output and SAS code as part of your answer to each question. Type your answers unless it requires lengthy hand derivation.

Due: 1PM, Feb 1, 2018 (send gebregz@musc.edu and stevensd@musc.edu)

Please include your last name in the file name that you send via e-mail to me.

1. The data below comes from a study of lung function in Cystic Fibrosis patients. It included 200 patients (102 males and 98 females) and measurements on FEV1 (forced expiratory volume in one second) were given at five time points. Data on age of the patient on each visit, gender, mutation of the F508 genotype (1=homozygous, 0=non-homozygous) status of patients were recorded. The goals of the study were (1) to determine if the rate of decline in FEV1 varies by gender and f508 status (1=homozygous, 0=non-homozygous (heterozygous or no mutation)).
Note: make use of the plots you made in homework 1
 - a. Using a profile mean model (where time is categorical), choose the best covariance pattern (UN, CS, AR(1), ARH(1)) that allows you to make comparisons between males and females.
 - b. Using the best covariance model you identified in (a), check whether allowing the variance-covariance matrix to vary by gender improves your model fit. Use the GROUP statement in PROC MIXED.
 - c. Using covariance pattern you selected in (a and b), select the best parametric mean model that allows you to test whether the rates of change in FEV1 over time differ between males and females
 - d. Fit a linear mixed model with (a) random intercept, (b) random intercept and slope assuming linear trend of FEV1 over time and uncorrelated error terms. Which model do you think is more appropriate for comparing the rates of change in FEV1 over time between males and females?
 - e. For the best model in (d) comment on the following using residual and influence plots: (a) normality assumption (b) specification of the conditional model using studentized residual plot and (c) identify if there are any influential observations.
 - f. Write a short summary of your findings (up to one page)