

STAT 8004, HOMEWORK 6

Group # ... (Replace this)

Members: ... (Replace this)

Apr. 3, 2014

This homework is due Thu., 2014/04/10, 5:30pm.

Instructions: Generate a PDF file from it and submit the PDF file to blackboard. Each group should submit one file with file names **hw[number]-[groupnumber].pdf**. For example, “hw01-1.pdf” for homework 1 and group 1. Please also include your R code in the appendix.

Problem 1. (50 points) A medical study is conducted to compare the success rates of two treatments for kidney stones. The table shows the success rates and numbers of treatments for treatments involving both small and large kidney stones, where Treatment A includes all open procedures and Treatment B is percutaneous nephrolithotomy:

	Treatment A	Treatment B
Small Stones	93%(81/87)	87%(234/270)
Large Stones	73%(192/263)	69%(55/80)
Both	78%(273/350)	83%(289/350)

a) (10 points) Perform within-strata analysis and marginal unadjusted analysis on the data. Display your results as Table 3 in the notes of Lecture 8.

b) (10 points) Perform stratified analysis and display your results as Table 5 in the notes of Lecture 8.

c) (10 points) Test the global hypothesis

$$H_0 : OR_j = 1, j = 1, 2$$

using conditional Mantel-Haenszel test.

d) (10 points) Form a logistic model without interaction for the data to study the effect of the treatment. Interpretate each parameter in the model.

e) (10 points) Fit the model in R. What are the estimates of each parameter? What is the estimated odds ratio for the treatment effect in each stone group?

Problem 2. (10 points) Consider the exponential risk model using the log link:

$$\log \pi_i = \alpha + \mathbf{x}_i^T \boldsymbol{\beta}.$$

Derive the likelihood, log-likelihood, the score estimating equations, and the elements of the Hessian.

Problem 3. **You don't need to turn in the solution to this part.** Please program the iterated reweighted least squares in R. Try the example in Problem 1 and compare the estimated value with the results yielded by the R function `glm`.