

## Stat 215b (Spring 2004): Lab 5

B. M. Bolstad  
bolstad@stat.berkeley.edu

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This lab is a continuation of the previous lab. Suppose now we have an additional sample of similarly analyzed blood. The data file `radioactive2.dat`, on the webpage, contains three columns: the first is the time (in days after reinjection), the second column are the counts from the previous lab. The third column is a new series of counts.

In this lab we will use a slightly different model. First, assume that the background radiation level has been measured and assumed to be zero. Also, assume that all the counts are independent Poisson variables with expected value given by the model

$$E(N_{1t}) = \beta_1 \exp(-\gamma_1 t) \quad \text{and} \quad E(N_{2t}) = \beta_2 \exp(-\gamma_2 t)$$

where  $N_{1t}$  is the first sample and  $N_{2t}$  is the second sample.

Write a report that addresses the following points.

1. Estimate the parameters  $\beta_1$ ,  $\beta_2$ ,  $\gamma_1$ , and  $\gamma_2$ . Consider how generalized linear models could be used. Also give relevant standard errors and correlations for the estimator.
2. State assumptions on which your model is based and perform tests of their validity. DO not be overly brief in your answer.
3. Test these hypotheses:
  - (a)  $H_0 : (\beta_1, \gamma_1) = (\beta_2, \gamma_2)$
  - (b)  $H_0 : \gamma_1 = \gamma_2$

You might want to use an analysis of deviance table to present your results.