2^{nd} practice sheet multivariate methods II

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5. Given a two-dimensional multiplicative Poisson model, show:
   Let $\lambda(M)$ be the quotient of the maximum likelihood of model M and the maximum likelihood of the saturated model. Let further be $lq(M)$ the likelihood ratio statistic: $lq(M) = 2\sum_i x_i \ln \frac{x_i}{\hat{m}_i}$. Then we get:

$$lq(M) = -2 \cdot \ln(\lambda(M))$$

6. The following table comes from a study of the Departments of Social Science of the University of Liverpool. The connection between the conditions under which home exercises have been done and the evaluation of the home exercises by a teacher should be studied.

homework condition	evaluation A	B	C
A	141	131	36
B	67	66	14
C	114	143	38
D	79	72	28
E	39	35	16

   (a) Use the SAS procedure proc CATMOD and generate a proper SAS data set

   (b) Test the data for independent variates, i.e. test the multiplicative Poisson model against the saturated model.

7. The following data come from a survey by Bishop, Fienberg and Holland (1975). Cuttings (Stecklinge) of different length were planted at different times and their survival status was recorded:

		survival status	
length	time	dead	alive
short	winter	156	84
short	spring	84	156
long	winter	107	133
long	spring	31	209

   (a) Use the SAS procedure proc CATMOD and generate a proper SAS data set

   (b) Test the model with no three-variable interaction against the saturated model.

8. Use the data of exercise 7) for model fitting. You should employ the backward elimination technique and use the CONTRAST statement to produce the conditional test statistics $lq(M_1|M_2)$.

   The probability for the experimental error should be 5% in your fitting procedure.

   You also should print out a table of observed and predicted cell frequencies for the model found in your model fitting procedure.