

ST745, Spring 2008

Homework 7 Due: Tuesday, 04/22/2008

1. The following small data set contains the survival information from 4 patients and smoking status $z(1), z(2), z(3)$ and $z(4)$ at each death time

x (month)	δ	$z(1)$	$z(2)$	$z(3)$	$z(4)$
3	1	1	1	0	.
2	0	1	0	.	.
1	1	1	.	.	.
4	1	0	1	1	0

where x = time to failure or censoring (you may sort the data by x); δ = failure indicator: 1 = failure, 0 = censored; z = 1 for smoking and z = 0 for nonsmoking. Assume a proportional hazards model with time-dependent covariate $z(t)$:

$$\lambda(t|z(t)) = \lambda_0(t)e^{\beta z(t)}.$$

- (a) Construct the partial likelihood of β using this data set.
 - (b) plot the log partial likelihood of β in the range of $[-4, 4]$.
 - (c) Find $\hat{\beta}$ that maximizes the log partial likelihood function and hence calculate the standard error of your estimate.
 - (d) Repeat part (c) Using Proc Phreg in SAS.
2. Do problem 9.3 on page 326 of the textbook. The data set can be found from Example 7.9 on page 224 of the textbook (**Do as much as you can. This question is for additional credits of your final exam**).