ST745, Spring 2016

Homework 7 Due: Tuesday, 04/19/2016

1. The following small data set contains the survival information from 5 patients and their smoking status $z(1), z(3), z(4)$ and $z(5)$ at each observed death time, 1, 3, 4 and 5:

x (year)	δ	$z(1)$	$z(3)$	$z(4)$	$z(5)$
3	1	1	0	.	.
2	0	0	.	.	.
1	1	1	.	.	.
4	1	0	1	1	.
5	1	0	0	0	0

where x = time to failure or censoring (**you NEED 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.