HW7- Advanced Data Analysis

1. (20pt) The data below show survival times in months of patients with Hodgkin's disease who were treated with nitrogen mustard. Group A patients received little or no prior therapy whereas Group B patients received heavy prior therapy. Starred are observations are censoring times.

   Group A : $1.25, 1.41, 4.98, 5.25, 5.38, 6.92, 8.89, 10.98, 11.18, 13.11, 13.21, 16.33, 19.77, 21.08, 21.84^{+}, 22.07, 31.38^{+}, 32.61^{+}, 37.18^{+}, 42.92$

   Group B : $1.05, 2.92, 3.61, 4.20, 4.49, 6.72, 7.31, 9.08, 9.11, 14.49^{+}, 16.85, 18.82^{+}, 26.59^{+}, 30.26^{+}, 41.34^{+}$

   (a) (5pt) Obtain and plot the Kaplan Meier estimates of S_A and S_B, the survival functions of Group A and Group B, respectively.

   (b) (2.5pt) Estimate $S_A(10)$ and $S_B(10)$ using a 95% confidence interval.

   (c) (5pt) Test $H_0 : S_A = S_B$ against $H_a : S_A \neq S_B$. Use $\alpha = 0.05$.

   (d) (5) Assume that it appropriate to use Cox proportional hazard model to these data. That is assume that

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

   where $x = 0$ if group A and $x = 1$ if group 1. Estimate the hazard ratio using a 95% confidence interval. Interpret your result.

   (e) (2.5) Test $H_0 : \beta = 0$ against $H_a : \beta \neq 0$ using $\alpha = 0.05$.