Homework 3. (Ch.4 Right censored data)

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- 上傳檔案格式: pdf

1. (#4.1) Consider the study of the effect of ploidy on the survival of patients with cancer of the tongue. (Section 1.11) Using the data on aneuploid tumors (Textbook, Table 1.6).

Hint: 這筆資料在 library(KMsurv) 中名稱為 *tongue*. 包含 80 個舌癌病人的存活資料，病人依據基因型態分成兩群 (type=1: Aneuploid Tumor, type=2:Diploid Tumor)。本題只考慮 aneuploid tumors 的病人。

(a) Estimate the survival function. Use the KM estimator.
(b) Plot the estimated survival curve.
(c) Estimate the survival function at 12 weeks and 60 weeks after transplant. Find the standard errors for your estimates.
(d) Estimate the cumulative hazard function. Use the Nelson-Aalen estimator.
(e) Estimate the cumulative hazard rate at 60 weeks and find the standard error. Estimate the survival rate at 60 weeks by using the cumulative hazard rate and compare to your estimate in (c).

2. Let

$$\tilde{S}(t) = \exp\left(-\tilde{H}(t)\right)$$

where $\tilde{H}(t) = \sum_{t_i \le t} \frac{d_i}{Y_i}$ (Nelson-Aalen estimator) and $\hat{S}(t) = \prod_{t_i \le t} \left(1 - \frac{d_i}{Y_i}\right)$ (Kaplan-Meier estimator). Show that $\tilde{S}(t) \approx \hat{S}(t)$ when the sample size (n) is large.

Hint: For large n, d_i/Y_i is small. $\ln\left(1 - \frac{d_i}{Y_i}\right) \approx -\frac{d_i}{Y_i}$.