1. A study was conducted on the effects of ploidy on the prognosis of patients with cancers of the mouth. Patients were selected who had a paraffin-embedded sample of the cancerous tissue taken at the time of surgery. The tissue samples were examined to determine if the tumor had an aneuploid (abnormal) or diploid (normal) DNA profile. Follow-up survival data was obtained on each patient. The data is contained in `tongue.txt` which can be downloaded from [www.stat.nus.edu.sg/~stachenz](http://www.stat.nus.edu.sg/~stachenz).

   (i) Estimate the survival function at one year and five years after surgery. Find the standard errors for your estimates.

   (ii) Estimate the cumulative hazard rate, \( H(t) \) at 60 months. Find the standard error of \( \hat{H}(t) \).

   (iii) Find a 95% log-log transformed confidence interval for \( S(60) \).

   (iv) Estimate the mean survival time. Also provide a 95% confidence interval for the mean survival time.

   (v) Estimate the median time to death and find a 95% confidence interval for the median.

2. The survival times of 25 patients with inoperative lung cancer entered on a study between Nov. 1, 1979, and Dec. 23, 1979, are contained in the data set `lungCancer.txt` which can be downloaded from [www.stat.nus.edu.sg/~stachenz](http://www.stat.nus.edu.sg/~stachenz). Complete follow-up was obtained on all patients so that the exact date of death was known. The study had one interim analysis conducted on March 31, 1980, by which time only 13 patients had died.

   (i) Estimate the survival function based on the available sample information at the time of the interim analysis on 3/31/80. Provide the standard error of your estimate.

   (ii) Compute the estimate the survival function and its standard error using the complete follow-up on each patient. Compare this estimate to that found in (i).

   (iii) Found the estimate of mean and its standard error based on the interim information.

   (iv) Found the estimate of mean and its standard error based on the complete information:

   a) by the Kaplan-Mier estimator, and b) by the usual sample mean and sample variance. Compare the two estimates.