Fall 16 – AMS276 Homework 2

Due: Tuesday November 8.

1. (KM Ex 12.1) In Section 1.11, a study of the effects of ploidy on survival for patients with cancer of the tongue was described. In the study patients were classified as having either an aneuploid or diploid DNA profile. The data is presented in Table 1.6. (check their R package for the data and a short description of the data). Use the R commands below to load the data into R;

```
library(KMsurv)  # To get the datasets in K-M
library(survival) # R functions

data(tongue)
tongue$time <- tongue$time/10  ## to obtain computational stability
```

   Consider the following Bayesian proportional hazards model;

   - Model 1 (M1): Parametric proportional hazards model: use the Weibull distribution for the baseline hazard function. Note that the AFT model with the Weibull distribution is a proportional hazards model (careful with the parameterization).
   - Model 2 (M2): Piecewise constant hazard model (ICS 3.1)
   - Model 3 (M3): Model using a Gamma process for the cumulative baseline hazard function (ICS 3.2)

   (a) Specify priors and derive the joint posterior distribution of all unknown parameters under *each of the models* (we did this in class but redo for practice!). Derive the full conditional distributions for unknown parameters.

   (b) Fit the models and summarize your posterior distributions. Comment on your posterior and compare the three models.

   (c) Estimate the survival functions for the group having the Aneuploid Tumor under the three models and compare.