

## Homework 2

1. Suppose that the time to event (failure time) is generated from Weibull distribution, whose hazard function is

$$\lambda(t) = \lambda\gamma(\lambda t)^{\gamma-1},$$

with parameters  $\lambda > 0$  and  $\gamma > 0$ . For all cases, please give the likelihood function and maximum likelihood estimators  $\hat{\lambda}$  and  $\hat{\gamma}$ , and plot the likelihood function.

**Case 1:** All observations are completed, which are presented in the dataset “Complete.xls”.

**Case 2:** Some observations are right censored by independent censoring times, which are presented in the dataset “Right censoring.xls”, where the first column contains observation times, and the second column contains indicators of censoring.

**Case 3:** Some observations are left censored by independent censoring times, which are presented in the dataset “Left censoring.xls”, where the first column contains observation times, and the second column contains indicators of censoring.

**Case 4:** All observations are interval censored, which are presented in the dataset “Interval censoring.xls”, where the first column contains left endpoints of intervals, and the second column contains right endpoints of intervals.

**Case 5:** All observations are left truncated by independent truncation times, which are presented in the dataset “Left truncation.xls”, where the first column contains observation times, and the second column contains left truncation times.

**Case 6:** All observations are right truncated by independent truncation times, which are presented in the dataset “Right truncation.xls”, where the first column contains observation times, and the second column contains right truncation times.

**Case 7:** Right censored observations in case 2 are dropped .

**Case 8:** Left censored observations in case 3 are dropped .

**Case 9:** Left truncation in case 5 is ignored .

**Case 10:** Right truncation in case 6 is ignored .