

University of California, Davis
Department of Public Health Sciences

Fall 2025
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Survival Analysis

BST 222
October 7, 2025

Homework Assignment 2

Due October 16, 2025

1. The SSA standard mortality table for 2019 is found at [Mortality Table](#). You will need to select the year 2019 from the dropdown menu instead of the 2021 table which appears at first. Compute the net present value of a series of two payments of \$1000 at the end of year 1 and at the end of year 2, each payment contingent on at least one of two people being alive at the time of the scheduled payment. Individual 1 is male aged 80 and individual 2 is female aged 75. You can assume that the chance of surviving a year at a given age is as given in the table. Use a discount rate of 5%.
2. A toxicology study with ten mice was conducted with results in the table below. For mice with Status = 1, the Time column is the elapsed time from administration of the toxin until the death of the mouse. For mice with Status = 0, the Time column is the elapsed time to end of the study, at which time the mouse is still alive.

Construct the Kaplan-Meier product-limit estimator of the survival function for this experiment.

Mouse	Time	Status
1	8	1
2	10	1
3	5	1
4	3	1
5	7	1
6	7	0
7	7	0
8	3	1
9	3	0
10	1	1

3. The data set `tongue` from `KMsurv` is described in KM section 1.11

Description:

The 'tongue' data frame has 80 rows and 3 columns.

Format:

This data frame contains the following columns:

type Tumor DNA profile (1=Aneuploid Tumor, 2=Diploid Tumor)
time Time to death or on-study time, weeks
delta Death indicator (0=alive, 1=dead)

- (a) Construct and plot the Kaplan-Meier survival function estimates for the two types of tumors, first without the confidence limits and then with the confidence limits.
- (b) Use `survdif` to test the hypothesis that the two true survival curves are the same. Interpret the results.
- (c) Compare the two Kaplan-Meier curves to the Nelson-Aalen estimates graphically. Interpret the results.
- (d) To investigate the proportionality of the two hazard curves, compute and plot the Nelson-Aalen cumulative hazards, the ratio of the cumulative hazards, and the smoothed hazards using `muhaz`. Does it look as if the hazards are proportional?