

P8131 Spring 2022 Homework #9

Due on April 22 at 11:59pm

1. Determine the survival and density functions for a continuous survival time variable with hazard function

$$h(x) = \frac{2x}{(1+x^2)}.$$

Hint: consider the derivative of $\log(1+x^2)$.

2. For the following data

1, 2, 2, 4+, 5+, 6, 7+, 8+, 9+, 10+,

where + denotes a right censored observation. Write out the data table and calculate the following by hand.

- (a) Find the Kaplan-Meier estimate of the survival function;
 - (b) Find the Nelson-Aalen estimate of the cumulative hazard function;
 - (c) Find the Fleming-Harrington estimate of the survival function.
3. Use the tongue data in the R package KMsurv. For each tumor type (aneuploidy and diploid), plot the Kaplan-Meier curve of survival function and its pointwise 95% confidence intervals (using the log transformation). What are the estimated 1-year survival rate and 95% CI?