Problem 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 $ln(1+x^2)$)

Problem 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.

1. Find the Kaplan-Meier estimate of the survival function;
2. Find the Nelson-Aalen estimate of the cumulative hazard function;
3. Find the Fleming-Harrington estimate of the survival function.

Problem 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?