1. For the "surv_times_data.txt" data given in the `data` folder under the `Course Content` tab of `eCampus`

   (a) Compute separate Kaplan-Meier survival curves for each of the two treatment groups. Make two plots, one for each of the two treatment groups, showing the estimated survival curves, and 95% pointwise confidence interval and comment on the differences between the curves for the two treatment groups. Which group has the better survival prognosis?

   (b) Obtain the estimate and 95% CI for the mean survival time for each group, based on the Kaplan-Meier survival curves.

   (c) Obtain the estimate and 95% CI for the 1st, 2nd, and 3rd quartiles of the survival times for each group, based on the Kaplan-Meier survival curves.

   (d) Plot the hazard functions for the two groups. Then use the log rank test to formally test for equality of the two survival curves. Report the chi-square statistic and the p-value. Comment on the results.

2. Suppose that the hazard function of T is $\lambda(t) = 0.5t^2$.

   (a) Obtain the analytical form of the survival function, and plot it over time between 0 and 5.

   (b) What is the mean of T?

   (c) Obtain the pth percentile of T. Also, provide the value of Q_1, Q_2 and Q_3.

3. Consider the kidney data in the survival library of R.

   (a) Obtain the estimate and 95% CI for the survival function $S(t)$ using the Kaplan-Meier and Nelson-Aalen approach, and plot them in the same figure.

   (b) Obtain the estimate and 95% CI for the mean using the both estimators of $S(t)$. You may use the bootstrap technique to construct the confidence interval for the mean.