Questions – Week 3 – Kaplan Meier

Q1

Two different treatments for back pain are being compared in a medical trial. Thirty-two people who have back pain are divided into two groups with half given a daily dose of painkillers and the other half asked to complete certain exercises each morning. At the end of each day the patients are asked to report on whether their pain has gone. The results of the trial are summarised below with the number of days until the first report of pain going for each patient. Figures marked with a * indicate people who stopped taking the drug or doing the exercises after that number of days but before being pain-free.

Daily Painkiller

7	5	4	1	5	1	2*	3
2	5	3*	3	5	7	6*	2

Exercise Routine

2	2*	3*	1*	3	5	5*	4*
4	5*	5*	6	4	6	1	4

(a) Explain why the Kaplan-Meier estimate might be suitable for this study.
(b) Write down an expression for the Kaplan-Meier estimate of the survival function and explain what each term means with respect to this medical study.
(c) How might the survival function be used to assess the two treatments in this trial?
(d) Evaluate the Kaplan-Meier estimate for the painkiller treatment and the exercise routine.
(e) What conclusions are we able to make about which treatment is more effective from the survival function estimates in (d) above?
(f) Suggest ways in which this study could be improved.

Q2

The university buys 100 new whiteboard marker pens and place one in each of the 100 teaching rooms on campus. All lecturers are all told to use the new pen until it runs out of ink. At the end of each day somebody goes to each teaching room to check whether the pens are still working. In the first week they report the following data.

End of day	Monday	Tuesday	Wednesday	Thursday	Friday
Pens out of ink that day	2	6	13	9	16
Pens gone missing that day	0	2	2	0	3

Use the Kaplan-Meier method to:

(a) Find the hazard for pens running out of ink each day

(b) Estimate the probability that a new pen is still working at the end of the week