10-Minute In-Class Quiz 1: Survival Analysis (Chapters 1–3)

Instructions

- You have **10 minutes** to complete this quiz.
- Answer all questions *concisely*.
- Show all relevant setup and multiplication steps, but **you do not need to compute final decimal values**.

Question 1

A cardiology team is studying **time to hospital readmission (months)** after discharge for acute heart failure.

- Event = readmission
- Censored = end of follow-up without readmission

Ten patients are followed for up to 12 months.

Patient	Follow-up time (months)	Event? (1 = yes, 0 = censored)
1	1.5	1
2	2.0	1
3	3.5	0
4	4.0	1
5	5.0	1
6	6.5	0
7	7.0	1
8	8.0	1
9	10.0	0
10	10.5	1

(a) Construct the risk-set table

1. List the distinct event times (t_j).
2. At each event time, compute:
    - Number at risk at that time (n_j).
    - Number of events at that time (d_j).
    - The discrete hazard = (d_j/n_j).

Present your work in a table.

(b) Kaplan–Meier estimates

Using the product-limit method:

1. Compute the Kaplan–Meier estimate at **5 months**.
2. Compute the Kaplan–Meier estimate at **8 months**.

Show each multiplication step clearly.

(c) Interpretation

Based on your result in part (b), what percentage of patients remain free of readmission at 8 months?

Question 2

You fit a **Kaplan-Meier estimator** to a dataset and obtain the following estimated survival probabilities at two time points:

$$\hat{S}(3) = 0.80, \quad \hat{S}(5) = 0.65.$$

For a subject who has already survived to 3 (years), what is their probability of surviving to 5 (years)?