WS #14 - Kaplan-Meier Curves

Math 150, Jo Hardin

Wednesday, March 11, 2026

Your Name: ____

Names of people you worked with: ____

Is a hot dog a sandwich?

Task: Sticking with the chocolate melting context, consider a different dataset.

Student	1	2	3	4	5	6	7
Time	45^+	35	48	64^+	72	42	55^+

1. Fill out the following table indicating at risk observations (n_i) and events (d_i).

t_i	n_i	d_i	$n_i - d_i$	$\frac{n_i - d_i}{n_i}$
35				
42				
45				
48				
55				
64				
72				

2. Fill out the following table estimating $S(t)$ using the Kaplan-Meier estimates.

time interval	$\hat{S}(t)_{KM}$
$[0, 35)$	
$[35, 42)$	
$[42, 45)$	
$[45, 48)$	
$[48, 55)$	
$[55, 64)$	
$[64, 72)$	
$[72, \infty)$	

3. Sketch the Kaplan-Meier curve using the values in #2 above. Note that t = time is on the x-axis, and $\hat{S}(t)_{KM}$ is on the y-axis.

Solution:

1. Counting the number of at risk observations and events:

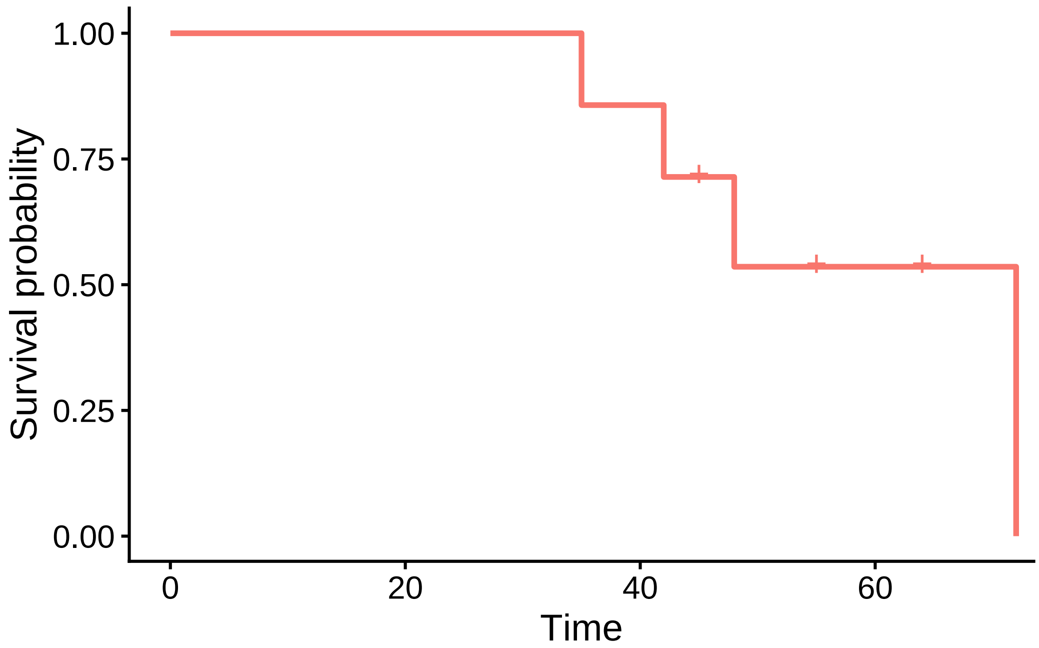
t_i	n_i	d_i	$n_i - d_i$	$\frac{n_i - d_i}{n_i}$
35	7	1	6	6/7= 0.857
42	6	1	5	5/6 = 0.833
45	5	0	5	5/5 = 1
48	4	1	3	3/4=0.75
55	3	0	3	3/3=1
64	2	0	2	2/2=1
72	1	1	0	0/1=0

2. Estimating the survival curve:

time interval	$\hat{S}(t)_{KM}$
$[0, 35)$	1
$[35, 42)$	0.857
$[42, 45)$	$0.857 \cdot 0.833 = 0.714$
$[45, 48)$	$0.714 \cdot 1 = 0.714$
$[48, 55)$	$0.714 \cdot 0.75 = 0.536$
$[55, 64)$	$0.536 \cdot 1 = 0.536$
$[64, 72)$	$0.536 \cdot 1 = 0.536$
$[72, \infty)$	$0.536 \cdot 0 = 0$

3. Sketching the survival curve. Notice the hash marks (where the censored observations occurred).

```r
surv_data <- data.frame(
  time = c(45, 35, 48, 64, 72, 42,55),
  censor = c(0, 1, 1, 0, 1, 1, 0))
survival::survfit(Surv(time, censor) ~ 1, data = surv_data) |>
survminer::ggsurvplot(conf.int = FALSE, legend = "none")
```


Survival probability
1.00
0.75
0.50
0.25
0.00
0
20
40
60
Time