

LECTURE WEEK 10 Supplement
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TMA4275 LIFETIME ANALYSIS

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1

RECURRENT EVENTS

RELIABILITY ANALYSIS:

- Repairable systems – events correspond to failures and repairs
- Manufactured products – events are warranty claims
- Example: Proschan(1963) – failures of airconditioners in Boeing airplanes

MEDICAL STUDIES:

- Repeated events, e.g. recurrence of infections, epileptic seizures, cancer
- Example: Aalen and Husebye (1991) – gastroenterology

2

PROSCHAN'S AIRCONDITION DATA

13 planes, 17 systems due to Major Overhaul

Plane	Interfailure times						
7907	194	15	41	29	33	181	
7908	413	14	58	37	100	65	9
	169	447	184	36	201	118	
7908 MO	34	31	18	18	67	57	62
	7	22	34				
7909	90	10	60	186	61	49	14
	24	56	20	79	84	44	59
	29	118	25	156	310	76	26
	44	23	62				
7909 MO	130	208	70	101	208		
⋮			⋮				

3

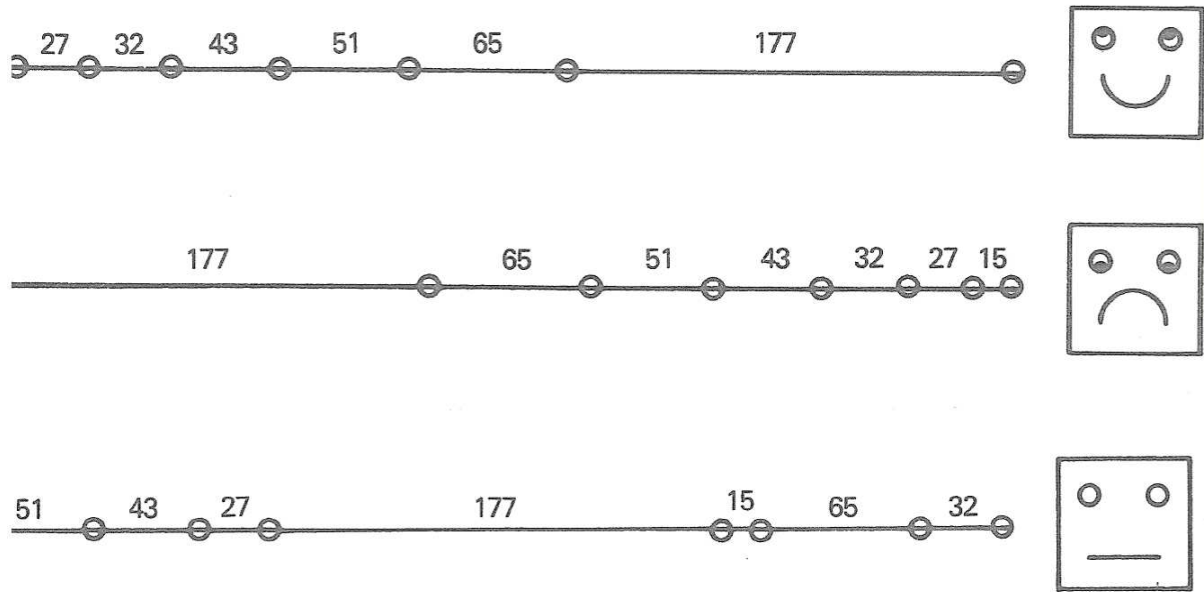
AALEN AND HUSEBYE'S DATA

19 individuals, 1-9 events per individual

Individual	Observed periods					
1	112	145	39	52	21	34
	33	51	(54)			
2	206	147	(30)			
3	284	59	186	(4)		
4	94	98	84	(87)		
5	67	(131)				
6	124	34	87	75	43	38
	58	142	75	(23)		
7	116	71	83	68	125	(111)
8	111	59	47	95	(110)	
9	98	161	154	55	(44)	
10	166	56	(122)			
⋮						

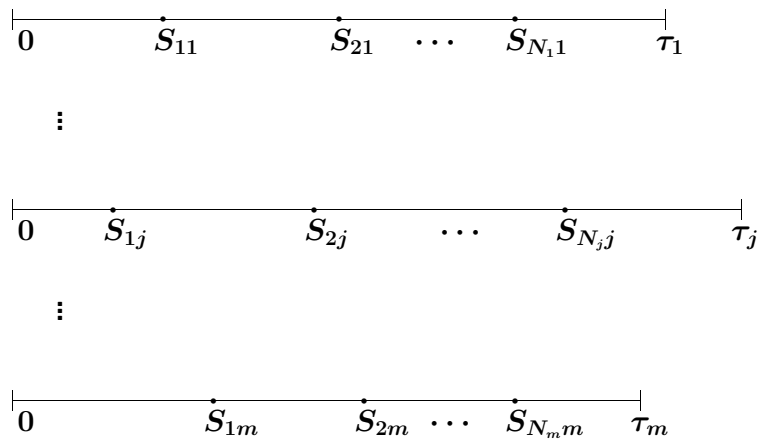
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Three systems with the same interfailure times



5

TYPICAL DATA – RECURRENT EVENTS



6