

FORELESNING 9

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18. mars

TMA4275 LEVETIDSANALYSE

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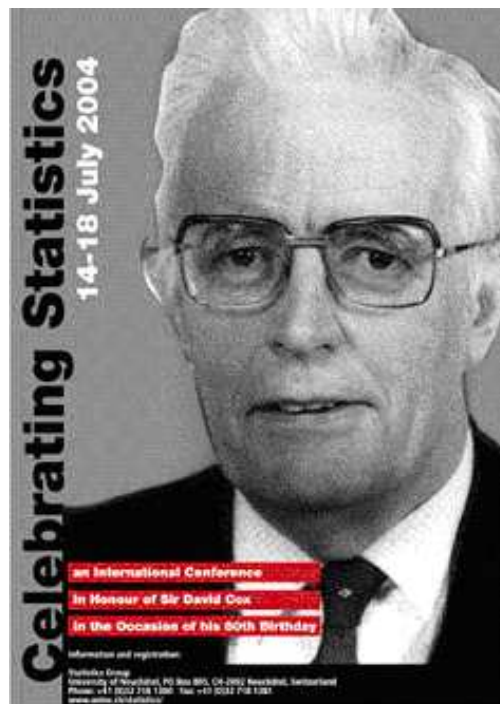
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Sir David Cox (1924–)



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EXAMPLE COX-REGRESSION

j	Y_j	x_j	δ_j
1	5	12	0
2	10	10	1
3	40	3	0
4	80	5	0
5	120	3	1
6	400	4	1
7	600	1	0

Model:

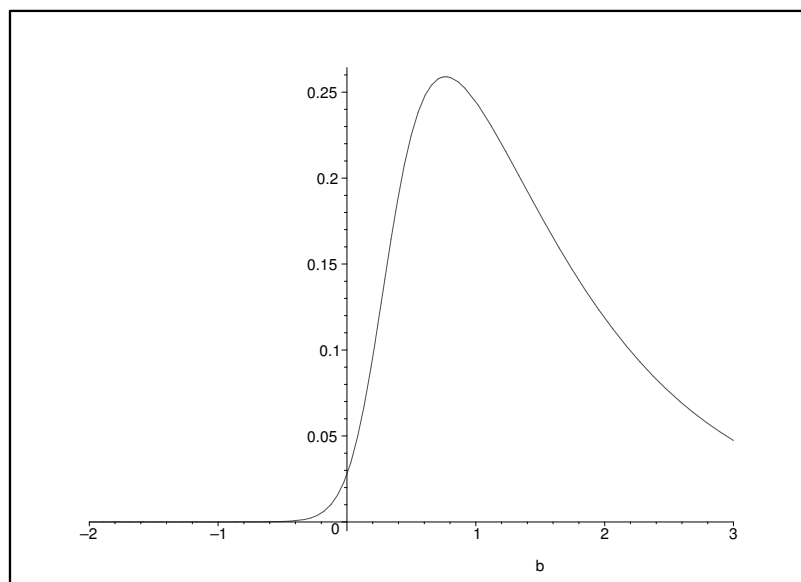
- $\lambda(t|x) = \lambda_0(t) \exp\{\beta x\}$

Partial likelihood:

$$L(\beta) = \frac{e^{10\beta}}{e^{10\beta} + e^{3\beta} + e^{5\beta} + e^{3\beta} + e^{4\beta} + e^{\beta}} \cdot \frac{e^{3\beta}}{e^{3\beta} + e^{4\beta} + e^{\beta}} \cdot \frac{e^{4\beta}}{e^{4\beta} + e^{\beta}}$$

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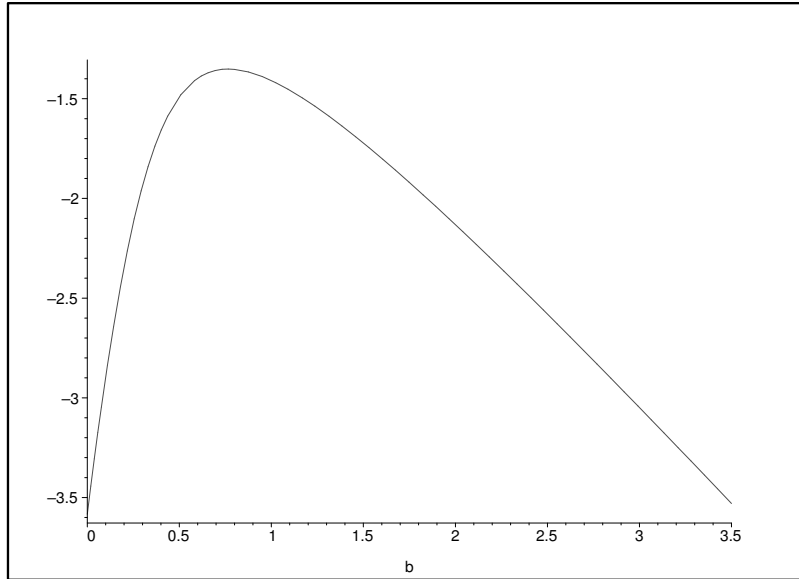
Cox' partial likelihood $L(\beta)$ in the example:



Maximum likelihood estimate: $\hat{\beta} = 0.765$.

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Cox' partial log-likelihood $l(\beta)$ in the example:



Maximum likelihood estimate: $\hat{\beta} = 0.765$.

95% likelihood confidence interval: (0.1, 3.2).

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Weibull regression (Cox-example)

Regression with Life Data: Y versus x

Response Variable: Y

Censoring Information Count
 Uncensored value 3
 Right censored value 4

Censoring value: d = 0

Estimation Method: Maximum Likelihood

Distribution: Weibull

Relationship with accelerating variable(s): Linear

Regression Table

Predictor	Coef	Standard Error	Z	P	95,0% Normal CI	
					Lower	Upper
Intercept	7,58636	0,548229	13,84	0,000	6,51185	8,66087
x	-0,468235	0,0842830	-5,56	0,000	-0,633427	-0,303044
Shape	2,05563	0,872169			0,894943	4,72167

Worksheet 1 ***								
	C1	C2	C3	C4	C5	C6	C7	C8
	Y	x	d					
1	5	12	0					
2	10	10	1					
3	40	3	0					
4	80	5	0					
5	120	3	1					
6	400	4	1					
7	600	1	0					

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Data fra Ansell & Phillips (s. 63)

Table 3.2. Lifetimes (in cycles) of sodium sulphur batteries

Batch 1	164	164	218	230	263	467	538	639	669
	917	1148	1678+	1678+	1678+	1678+			
Batch 2	76	82	210	315	385	412	491	504	522
	646+	678	775	884	1131	1446	1824	1827	2248
	2385	3077							

Note: Lifetimes with + are right censored observations, not failures.

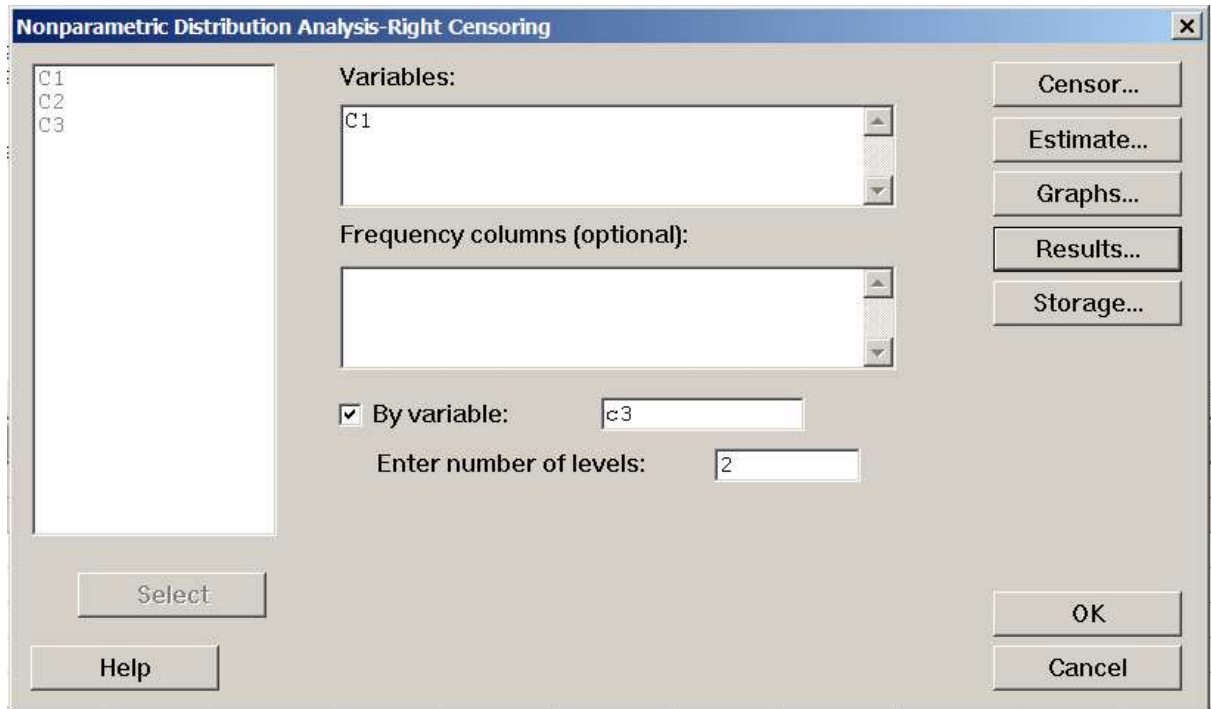
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C1=Obs. tider, C2=sensurering, C3="batch" nr.

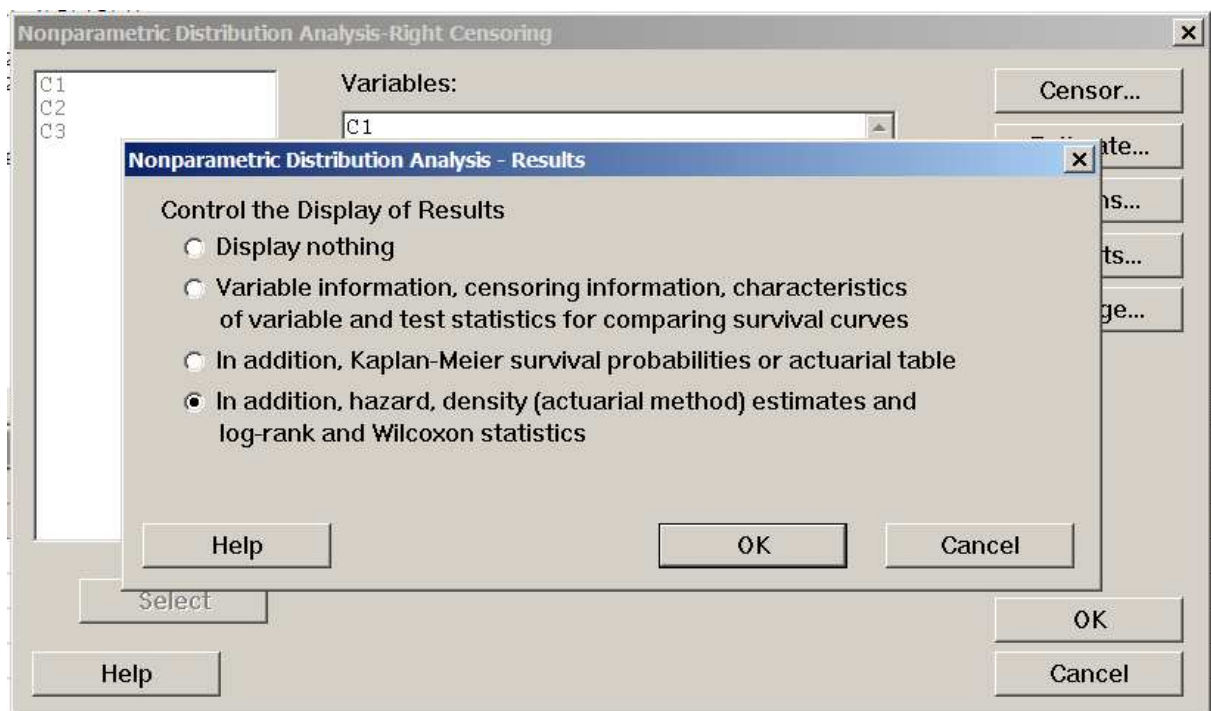
Ansell32.MTW ***												
+	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
1	164	1	1									
2	164	1	1									
3	218	1	1									
4	230	1	1									
5	263	1	1									
6	467	1	1									
7	538	1	1									
8	639	1	1									
9	669	1	1									
10	917	1	1									
11	1148	1	1									
12	1678	0	1									
13	1678	0	1									
14	1678	0	1									
15	1678	0	1									
16	76	1	2									
17	82	1	2									
18	210	1	2									
19	315	1	2									
20	385	1	2									
21	412	1	2									
22	491	1	2									
23	504	1	2									
24	522	1	2									
25	646	0	2									

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MINITAB-analyse av dataene fra Ansell & Phillips:



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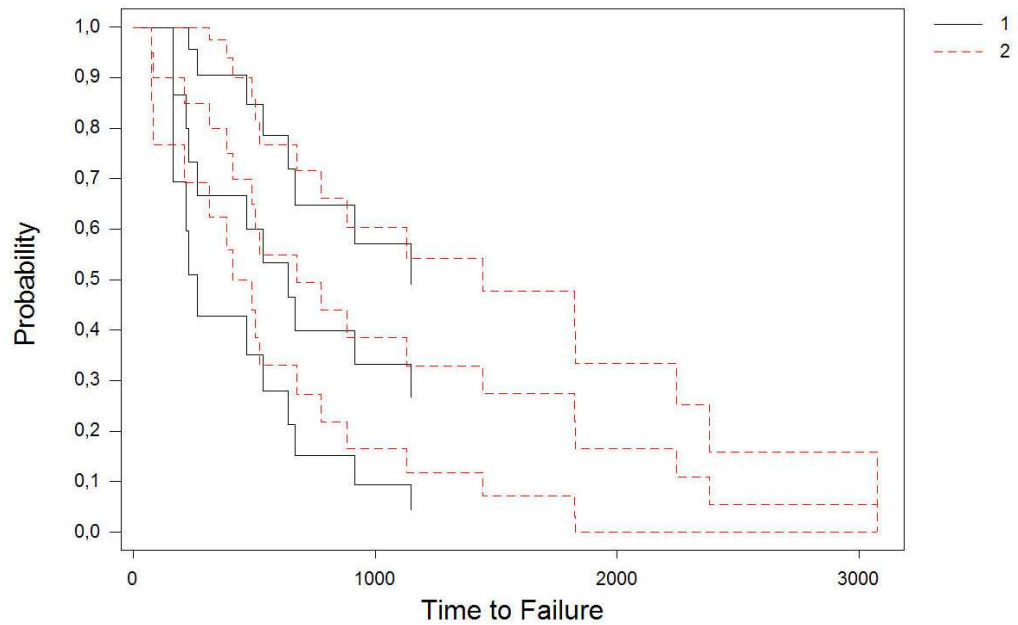


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Nonparametric Survival Plot for C1

Kaplan-Meier Method - 95,0% CI

Censoring Column in C2



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MINITAB-resultat (blant mye annen output):

Test Statistics Method

Chi-Square	DF	P-Value
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Log-Rank	0,04855	1	0,8256
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Dette stemmer overens med resultatet s. 72 (Example 3.5.2) i Ansell & Phillips.

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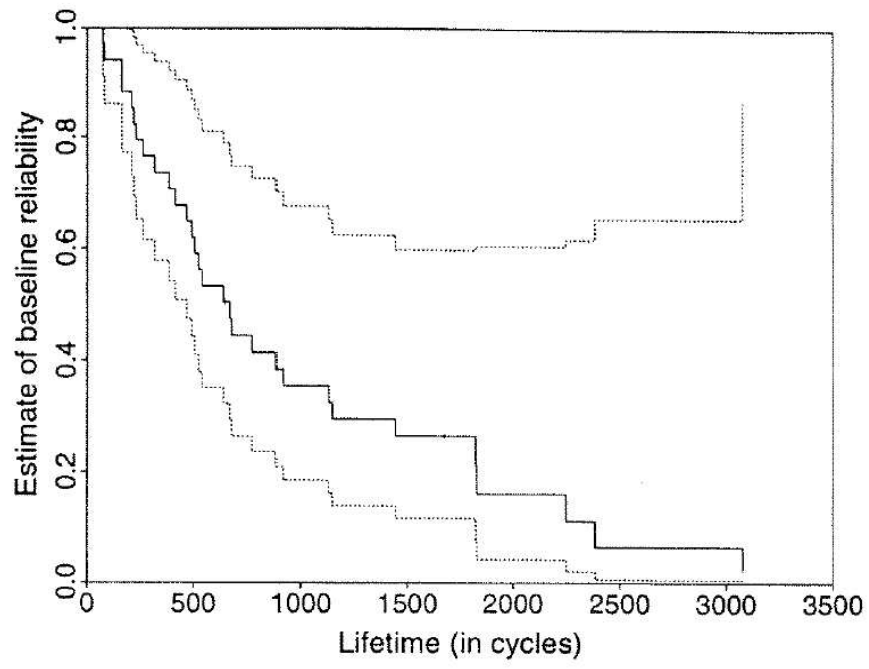


Fig. 3.3. Plot of the baseline reliability function for the proportional hazards model for the sodium sulphur battery data with 95% confidence limits

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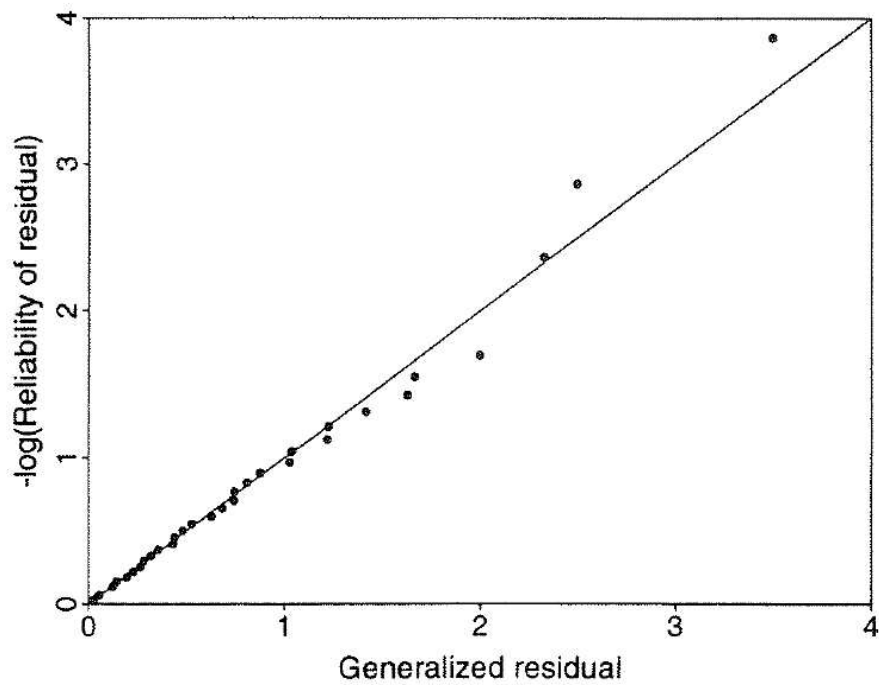


Fig. 3.5. Plot of the generalized residuals of the proportional hazards model for the sodium sulphur battery data

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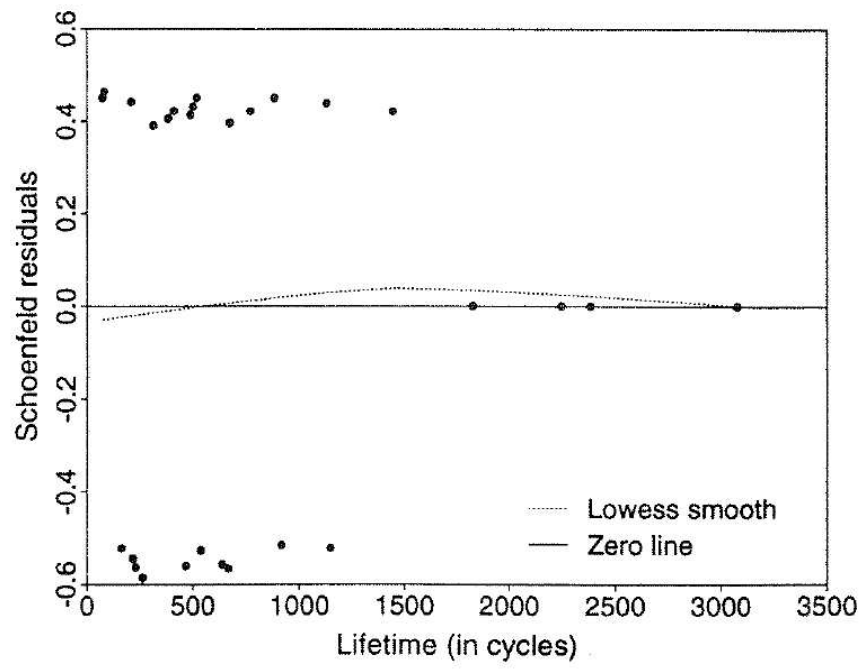
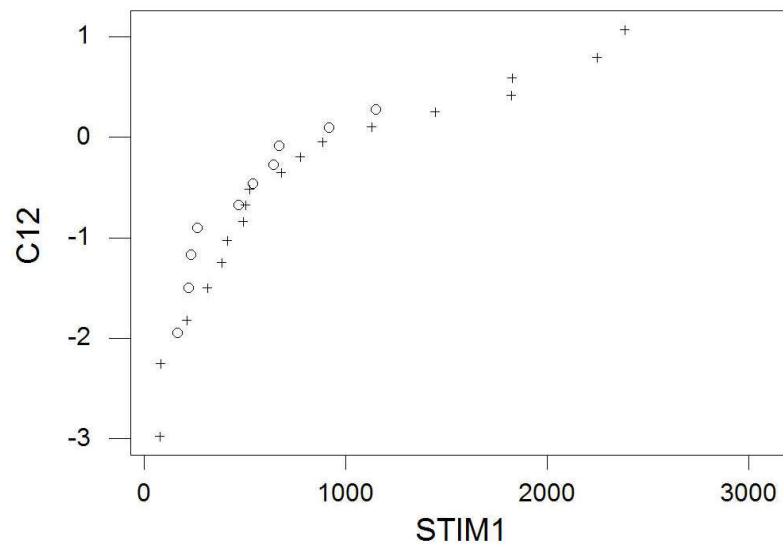


Fig. 3.7. Plot of the Schoenfeld residuals for batch of the proportional hazards model for the sodium sulphur battery data

LOG MINUS LOG PLOTT MOT "t" FOR A&P DATA (s.63)

Parallele plott tyder på Proportional Hazard



**LOG MINUS LOG PLOTT MOT "log t" FOR A&P DATA
(s.63)**

Rette linjer tyder på Weibull-fordeling

