

## Aufgabe 19.1

### Analysis of a $2^{4-1}$ Design

	C1D1	C1D2	C2D1	C2D2
A1B1		40	15	
A1B2		20	10	
A2B1	100			30
A2B2	120			50

### $2^{4-1}$ Design

Exp. No	I ACD	A CD	B ABCD	C AD	AB BCD	AC =D	BC ABD	ABC BD	y
1	1	-1	-1	-1	1	1	1	-1	40
2	1	1	-1	-1	-1	-1	1	1	100
3	1	-1	1	-1	-1	1	-1	1	20
4	1	1	1	-1	1	-1	-1	-1	120
5	1	-1	-1	1	1	-1	-1	1	15
6	1	1	-1	1	-1	1	-1	-1	30
7	1	-1	1	1	-1	-1	1	-1	10
8	1	1	1	1	1	1	1	1	50
<b>Main Effects</b>	385 <b>48.13</b>	215 <b>26.88</b>	15 <b>1.88</b>	-175 <b>-21.88</b>	65 <b>8.13</b>	-105 <b>-13.13</b>	15 <b>1.88</b>	-15 <b>-1.88</b>	Total Total/8
Main pow 2		722.27	3.52	478.52	66.02	172.27	3.52	3.52	1449.61
<b>% Main Effects</b>		<b>49.82%</b>	<b>0.24%</b>	<b>33.01%</b>	<b>4.55%</b>	<b>11.88%</b>	<b>0.24%</b>	<b>0.24%</b>	

Sorted with decreasing effect: A C D AB B BC BD

Generator: I=ACD Confoundings see above

A better design would be I=ABCD ( $R_{IV}$ )

The resolution of this design is  $R_{III}$  (see generator)

## Aufgabe 19.2

Is it possible to have a  $2^{4-1}_{III}$  design?

Yes, I=ABC

Is it possible to have a  $2^{4-1}_{II}$  design?

Yes, I=AB

Is it possible to have a  $2^{4-1}_{IV}$  design?

Yes, I=ABCD

## Aufgabe 21.3

### Two Factor Design without replication

Workload	RISC I	Z8002	VAX11	PP11	C/70	Summe	Mean	Effect
E-String Search	4.94	4.84	4.58	4.72	4.58	23.67	4.73	-1.40
F-Bit Test	4.79	5.19	4.97	5.12	4.79	24.86	4.97	-1.16
H-Linked List	5.17	4.95	5.35	5.70	4.95	26.12	5.22	-0.91
K-Bit Matrix	5.66	5.92	5.66	5.92	5.76	28.93	5.79	-0.35
I-Quick Sort	6.90	6.99	6.79	6.99	6.79	34.48	6.90	0.76
Ackermann (3,6)	4.97	5.71	4.28	4.45	4.45	23.87	4.77	-1.36
Recursive Qsort	7.91	7.22	7.22	7.40	7.40	37.16	7.43	1.30
Puzzle (Subscript)	7.94	7.24	7.24	7.24	7.43	37.09	7.42	1.28
Puzzle (Pointer)	6.62	6.40	6.11	5.93	5.93	30.99	6.20	0.07
SED (Batch Editor)	9.78	9.78	9.27	9.09	9.09	47.02	9.40	3.27
Tower Hanoi 18	4.56	5.48	4.34	4.56	4.20	23.16	4.63	-1.50
Summe	69.25	69.73	65.83	67.15	65.38	337.35		
Mean	6.30	6.34	5.98	6.10	5.94		6.13	
Effect	0.16	0.21	-0.15	-0.03	-0.19			

SSY	sum(yij pow 2)	2188.68
SS0	ab* (mean pow 2)	2069.13
SSA	b*sum(alphaj pow 2)	1.40
SSB	a*sum(betaj pow 2)	114.88
SST	SSY-SS0	119.54
SSE	SST-SSA-SSB	3.26

Percentage of variation explained by the processors	100*SSA/SST	1.18
Percentage of variation explained by the codes	100*SSB/SST	96.10
Unexplained variation	100*SSE/SST	2.73

ANOVA Table:

Component		Sum of Squares	Percent. of Var	Degrees Freedom	Mean Square	F-Comp.	F-Table
Y	SSY	2188.68					
$Y_{mean}$	SS0	2069.13					
$Y - Y_{mean}$	SST	119.54	100.00	54			
Processors	SSA	1.40	1.18	4	0.35	4.31	> 2.09
Codes	SSB	114.88	96.10	10	11.49	140.92	> 1.76
Errors	SSE	3.26	2.73	40	0.08		

Several processor pairs as well as code pairs are significantly different at 90% confidence level.