Two-Level Fractional Factorial Designs

2^{k-p} designs for k factors in 2^{k-p} runs

showing p defining relations for introducing new factors

2^{k-p} runs	k factors								
	3	4	5	6	7	8	9	10	
4	2^{3-1}_{III} C=AB								
8	2^{3}–	2^{4-1}_{IV} D=ABC	2^{5-2}_{III} D=AB E=AC	2^{6-3}_{III} D=AB E=AC F=BC	2^{7-4}_{III} D=AB E=AC F=BC G=ABC				
16	2 * 2^{3}–	2^{4}–	2^{5-1}_{V} E=ABCD	2^{6-2}_{IV} E=ABC F=BCD	2^{7-3}_{IV} E=ABC F=BCD G=ACD	2^{8-4}_{IV} E=BCD F=ACD G=ABC H=ABD	2^{9-5}_{III} E=ABC F=BCD G=ACD H=ABD I=ABCD	2^{10-6}_{III} E=ABC F=BCD G=ACD H=ABD I=ABCD J=AB	1/64 rep
32	4 * 2^{3}–	2 * 2^{4}–	2^{5}–	2^{6-1}_{VI} F=ABCDE	2^{7-2}_{IV} F=ABCD G=ABDE	2^{8-3}_{IV} F=ABC G=ABD H=BCDE	2^{9-4}_{IV} F=BCDE G=ACDE H=ABDE I=ABCE	2^{10-5}_{IV} F=ABCD G=ABCE H=ABDE I=ACDE J=BCDE	1/32 rep
64	8 * 2^{3}–	4 * 2^{4}–	2 * 2^{5}–	2^{6}–	2^{7-1}_{VII} G=ABCDEF	2^{8-2}_{V} G=ABCD H=ABEF	2^{9-3}_{IV} G=ABCD H=ACEF I=CDEF	2^{10-4}_{IV} G=BCDF H=ACDF I=ABDE J=ABCE	1/16 rep
fraction (along diagonal)	x8	x 4	x 2	full	1/2 rep	1/4 rep	1/8 rep	1/16 rep	

k = number of factors

p = number of factors confounded with high order effects

designs of Resolution III or lower (not recommended for model building)

designs of Resolution IV (proceed cautiously, must resolve 2-way interactions!)

designs of Resolution V or better (great! Main and 2-way effects can be estimated clearly!)

Adapted from Table 12.15, Box, Hunter and Hunter, Statistics for Experimenters, 1978, page 410; 2nd Ed, 2005, page 272

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