(80 H.OD) = Prodess I: For each the three decigns given below identify the following chemokratica.

Ci: The fraction of the Fill Design:

Cz: Re # of registed generates:

Co. The Hot implicit generators.

cy: The # of almoses fre each estruble effect:

(5: le # of E)'s (rus required)

(1) Deoign: 26-2

ci. 22 = 1

c,: 2

c3: 22-2-1 = 1

cy: 26-2 = 24 = 16

cs: 26-2=16

(2) Design: 27-3

e1: 23= 18

ce: 3

C3: 23-3-1=4

cy: 27-3 = 24 = 16

(5: 27-8 = 24 = 16

(3) Peoign: 2 -4

4: 24 = 16

C2: 4

cz: 24-4-1= 11

Cy: 27-4 = 23 = 8

c5: 27-4:23= 8

(82 20,)

Problem ?: Construct a 27-3 fractural factoral design any ABCF, CAEF, ADFCT as

the design generalors

· (i) Letwing Contrast =: I = ABCF, CDEF, ADF GT

(CC): In phant Ohny Contrasts: 23.3-1=4

· ABCF · CDEF = ABDE

· ABCF . ADFG = BCDG

* where does the 4th inplicat contract come from?

(multiply all defung contasts to jetture)

'CDEF - ADFOI = ACEOI

· ABLT . CDEF . ADFUT = BEF UT

(cii) Resolution=4

(iv) Alas sets for all man elect & two bules intermedias:

Alias Set	-		,						
1	I	AUCF	CDEF	AOFIN	ADDE	Bepin	ace in	35F6	
2	A	TOCE	73C)A	[proj	308	ADC. DU	TLEG	AGEFG	
3	B	ALF	COEF	ARDFU	[wa]	com	NEGA	EFIN	
.4	C	TARF	(DEE)	ACDFU	VOCA	[200]	AEG	BLEFG	
5	D	ARLDF	TEEF	[88m]	SOA	[eca]	ALDEG	BOEFU	
6	E	ABCEF	[CDF]	POEF (n	(924)	BCDEG	ACG	10800	
7	F	TABC	CDE	[AD In	ARDEF -	BCPFLA	ACEF W	BEG	
९	5	ADCFU	CAEFU	TADE	ADDECT	leio \	ACE	DEF	
q	BA	ICE	ABCDEF	BOEM	OE	ACDG	BCEG	AEFOI	
10	AC	BF	ADEF	COFU	scae	NOSA	26	ABC EF W	
ıi.	Q4	ROF	ACEP	FGI	BE	ADC 10	cDe in	ACOEFO	
12	AE	BCEF	ACDF	DEF14	3D	ABCDEN	<u>د لام</u>	ADFO	
S	<u>A</u> F	<u>3</u> C	ACDE	200	20€₽	ABCOGF	cefu	ARE ON	
14	HU	OCFU	ACDEFLA	DF	BOEG	AGCO	CE	ADEF	
15	30	ACFL	BCDEF U	7084	A0€ W	ده	ARCE ,	ĒF	
14	AZG	CF6	NECOEFLY	BOF	DELT	ACO	BCE	AEF	
	1 2 5 4 5 6 7 8 9 10 11 12 13 14 15	2 A B C D E F F F F A C A C A C A C A C A C A C A C	1 I ABCF 2 A TOCF 3 B ACF 3 B ACF 4 C TABF 4 C TABF 4 TABC 4 C TABF 7 F TABC 9 AD CFC 10 AC CF 10 AC CF 11 AD CCFC 11 AD CCFC 12 AF CCFC 13 AF CCFC 14 AC CCFC 15 EC ACFC 16 AC CCFC 17 AC CCFC 18 AC CCFC 19 AC CCFC	I I ABCF CDEF 2 A TOCE ACCET 3 B TALF CLOSED 4 C TARF TOCET 5 D ADCOF TOCET 6 F TARC COST 9 AD ICF ABCOST 10 AC OF ACCET 11 AD OCT ACCET 12 AE OCEF ACCET 13 AC OCEF ACCET 14 AU OCEG ACCET 15 OCEF ACCET 16 AC OCEF ACCET 17 OCEF ACCET 18 ACCET ACCET 19 ACCET ACCET 10 ACCET ACCET 11 ACCET ACCET 12 AE OCEF ACCET 13 AF OCEF ACCET 14 AU OCEFU ACCET 15 OCEFU ACCET 16 OCEFU 17 OCEFU 18	I I ARCE COEF ADEM 2 A TREE ROSE TOPM 3 B TACE ROSE ARDEM 4 C TARE TOSE ARDEM 5 D ARCOF TORE TASM 6 E ARCET TOPE FOR TASM 7 F TARC TOPE ARCHEM 9 AD ICE ARCET TOPM 10 AC RE ARCET ACEF TOPM 11 AD ROF ACEF FOR TASM 12 AE ROSE ACRE DEFM 13 AF ROSE ACRET DEFM 14 AM ROSEM ACRET DEFM 15 BM ACEM ACRETM DEFM 16 ACRET ACRETM DEFM 17 BM ACEM ACRETM DEFM 18 ACEM ACRETM DEFM 19 AM ROSEM ARCETM ARDETM 19 AM ROSEM ACRETM ARDETM 10 ACEM ACRETM DEFM 11 AM ROSEM ACRETM ARDETM 12 ACEM ACRETM ARDETM 13 ACEM ACRETM ARDETM 14 AM ROSEM ACRETM ARDETM 15 ROSEM ACEM ACRETM ARDETM 16 ROSEM ACRETM ARDETM 17 ROSEM ACEM ACRETM ARDETM 18 ROSEM ACEM ARDETM 18 ROSEM ACRETM ARDETM 18 ROSEM ACRETMANTANTANTANTANTANTANTANTANTANTANTANTANTA	I I ARCE COEF ADEM ADDE 2 A TOCE NODE ADDEM 3 B TALE RODE ADDEM 4 C TARE TOEF ACOSO NOCKE 5 D ARCOF TERE TAFON ADE 4 F TARE TOEF FORTO ADDEM 4 T TARE TOEF ADDEM 9 AD TOCE ADDEM 10 AC OF ADEF COFF DEFON 11 AD ROF ACEF FONT 12 AE OCEF ACOF DEFON 14 AU OCFM ACOEFM DE 15 DAM OCFM ACOEFM DE 16 AC OCEF ACOF DEFON 17 OCEM 18 OCEM 19 AU OCEM 10 AC OCEM 10 AC OCEM 11 AD OCEM 12 ACOM 13 ACOM 14 AU OCEM 15 OCEM 16 ACOEFM 17 OCEM 18 OC	1 I ABCF COEF ADFO ABDE CCOOR 2 A TOCET ACOEF TOFOL BDE ABCOOR 3 B TACE BOSED ADDED TOUR COOR 4 C TABET DEED ACOPO ROCK TOUR 5 D ADCOF TEEE TAFON ABET BOSED 6 E ABCET TOEF TOEFON TAD BE ACOPON 7 F TABC COEF TADIN ADDED BOSED 9 AD CEF ABCOEF BOFON DE ACOPON 10 AC BF ADEF COFON BCDE ABOON 11 AD BCDF ACEP FON BE ADCIN 12 AE BCEF ACOF DEFON DE ACOPON 13 AF BC ACOEFON DE BOEN BCOOR 14 AU DCFON ACOEFON DE BOEN ACOON 15 BC ACOEFON DE ACOPON 16 AC BE ACOPON 17 BC ACOEFON DE ACOPON 18 ACOPON 19 ACOPON 10 AC BE ACOPON 10 AC BE ACOPON 11 AD BCOFON ACOPON 12 AE BC ACOPON 13 AE BC ACOPON 14 AUN BCFON ACOPON 15 BC ACOPON 16 BC ACOPON 17 BC ACOPON 18 BC ACOPON 19 ACOPON 10 ACOPON 10 ACOPON 11 ACOPON 12 ACOPON 13 ACOPON 14 ACOPON 15 BC ACOPON 16 BCOOK 17 BCOOK 18 BC ACOPON 18 BC ACOPON 19 BC ACOPON 10 ACOPON 10 ACOPON 11 ACOPON 12 ACOPON 13 ACOPON 14 ACOPON 15 BC ACOPON 16 BCOOK 17 BCOOK 18 ACOPON 18 ACOPON 18 BC ACOPON 18 BC ACOPON 19 ACOPON 19 BCOOK 19 ACOPON 10 ACOPON 10 ACOPON 11 ACOPON 12 ACOPON 13 ACOPON 14 ACOPON 15 BCOOK 16 ACOPON 17 BCOOK 18 ACOPON 18 ACOPO	I I ARCE COET ADEM ADDE COOM ACE M 2 A TOCE MOST THEM SDE ACOM TOCK 3 B TALE SCORE ADDEM TOUM COM ACE M 4 C TARE DEED ACOPM TOUM COM ACCM 5 D ADOOF TORE TARM THE SCORE TACM 6 E ACCET TOCE TARM ACCE TO ACCEM TACM 7 F TARC COET TARE ACCEM TOCK 9 M ADOFM COETM TARE ACCEM TACM 9 M ADOFM COETM TARE ACCEM TACM 10 AC SF ACCEF TOTM OE ACCEM TOCK 11 AD ROF ACCEF FOR SCOR ACCM COEM 12 AE SCEF ACOF CETM DE ACCOR COEM 13 AF SC ACCEFM ABOF ACCEM ACCM 14 AM COEM ACCEFM ABOF ACCEM COEM 15 SM ACEM ACCEFM ABOF ACCEM COEM 16 ACCEM ACCEFM ABOF ACCEM COEM 17 SM ACEM ACCEFM ABOF ACCEM COEM 18 ACCEM ACCEFM ABOF ACCEM COEM 19 ACCEM ACCEFM ABOF ACCEM COEM 10 ACCEM ACCEFM ABOF ACCEM COEM 11 AM COEM ACCEFM ABOF ACCEM COEM 12 ACCEM ACCEM ACCEM ACCEM COEM ACCEM COEM 14 AM COEMM ACCEMM ABOF ACCEMM COEMM COEMM COEMM 15 SM ACEMM ACCEMM ABOF ACCEMM COEMM COEMM 16 ACCEMM ACCEMM ACCEMM ACCEMM COEMM COEMM 17 SM ACEMM ACCEMM ABOR ACCEMM COEMM 18 ACCEMM ACCEMM ABOR ACCEMM COEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM COEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM COEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM COEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM COEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM ACCEMM ACCEMM ACCEMM ACCEMM 18 ACCEMM AC	1

⁽¹⁾ Traturate: A, B, C, D, E, F, W, AB, AC, AD, AE, AT, AM, BO, ABO where A marches the treatment consists of factor A at is high hel ; BCDECT at the T bu lucts.

⁽²⁾ Infect veneralers (see above)

⁽³⁾ Resolution =4. (1) Man effects and consended al oter ware affects of two way reconstruction. if help in our represent is it.

ADC (BCDE. It is known that Factors A, B (C do not

whereit we one another and factor c, O. E do not whereit we me another.

- 1.) which effects can be estimated ignoring three Fewter interactions or higher.
 - · Implicit controls: ABC · BCDE = ADE => Resolution 3 => only man effects are not confunded will man effects.

Alias set

,	I	ABL	BCDE	ADE
2	A	BC	ACCDE	DE
3	ટ	AC	CDE	A60 E
Ч	C	AO	BDE	ACDE
5	٥	ABCD	ace	RE
U	٤	AUCE	BCD	AD
7	Q.A	BCD	ABCE	E - confounded w/E
К	AE	<u> ۵</u> رند	ABCD	D Conforded w/D
9	30	ACD	CE	ADE
10	3.6	ACE	CD	asa

· so we can estimate the wan effects of all factors and The two way intractions

- (2) Is it possible to have an improved resolution 2 2 design for this extension.
 - . No, we cannot her a higher resolution design.
 - · The resolution as equal to the number of factors in the smellest defining contrast, including the implicit ones.
 - o It one of our defining constructs contains & 3 decents, the our resolution will be \$3. If both of our defining contracts contain >3 decents the are two scenarios:
 - O 30th definy contrasts contain 4 elements.
 - · since we we 5 factors, these contrasts can differ by at most

 1 element => our implicit contrast how I element => our cooluten=1.
 - (3) One disting contrast contains 4 elements; the other certains Telements

 some as above, the two contrasts condiffer by out most I element

 => Roolson = 1.

(See H.O.10) -> Problem TV: In a resolution UTIT 2hop

(1) Man effects are not conferreded w/ which effects

Man effects are not conferreded w/ any (oway or fower interactions,

and cose why some 7-way and higher interaction.

(2) Two Way Interaction effects "

"5-way or lover"

"6-way and injur interactions

(C) Three-way Interaction effects are not confunded w/ which effects?

"Twee way interaction effects "

"4-way is laver "

(4) Four-way Interaction effects are not confunded w/ which effects?

(4) Four-way Interaction effects are not confunded w/ which effects?

(4) Four-way Interaction effects are not confunded w/ which effects?

"Four way interaction effects are not confunded w/ which effects?

"Four way interaction effects are not confunded w/ which effects?

"Four way interaction effects are not confunded w/ which effects?

"Four way interaction effects are not confunded w/ which effects?

"S-way or layer and we have been all or effects."

(ReHoll) Problem 5: Construct a Resolution 4 design that is a & fraction of a 28 factorial. Make over to provide your design generators and display a list of the treatments to be used in the expension.

· let our below be A.B.C.D.E.F. G. H

- · Design Generation A BCF, ABOLA, RCDEH
- · Impliest Coulous : · ABCF · ABD G = CDF G
 - · ABCF · BCOEH = ADEFH
 - · ABOM · BLOCH = ACEMIT
 - · ARCT. ABDG. BLDEH = BEFGH
- · See Figure 1. (Treatments are inducated by the first column, starting in the second row. The late's in the tretains inductes the Factors which are at their high well in the madeunt and the factors which are not included in the tot label are those factors which are at the low Hard in the beatherst.)



Rollem VI: (see Sas Program: ASSIMNA - PROBVI-SPZZ)

- (1) what is the resolution of the design?

 Resolution 5: the minimum # of elements in one of our defining contrasts

 (we only have I define contrast; no implicit couldes) is
 - 5. Also scetable on pg 21,
- (2) Show how the (+) (-) signs for the web of Factor E were determined for the design.
 - · we are given in the proller set up that

E = - ABCD.

- · For each row, if you multply 1 this the product of the dements in the row for colors A,B,C ,D you get the relie for E in each row.
- (3) Show the also shockers & The design.

Alias set

- I -ABCDE
- 2 A -BCDE
- 3 B -ACDE
- 4 e -ABDE
- 5 D ABCE
- 6 ABCD
- 7 AR CDE
- Y AC DDE
- 9 AD BCE
- 10 AE BCD
- 11 3C ADE
- 12 BD ACE
- 13 BE ACD
- 14 CD ABE
- CE ABD
- 16 DE ABC

Problem VI (control)

F

3

- (4) what assumptions must be made to estimate man effects and two factor wherechers free of any other effects?
- In order to estructe man effects and two factor interactions we must frest construct the expension to be of at least resolution of the the man effects are not confunded as any other man effects or two-factor interactions and the two-factor interactions are not confunded as any other two factor interactions. Fortunare we must assume that any 3-factor or night order interaction effects are cally nonexistent or regular.
- (5) Estimate the main effects and two-factor interactions of their standard eners?
 - · The reason we cannot estimate the standard errors is ble the df = 0.

1	ABCF	ABDG	BCDEH	CDFG	ADEFH	ACEGH	BEFGH
А	BCF	BDG	ABCDEH	ACDFG	DEFH	CEGH	ABEFGH
В	ACF	ADG	CDEH	BCDFG	ABDEFH	ABCEGH	EFGH
С	ABF	ABCDG	BDEH	DFG	ACDEFH	AEGH	BCEFGH
D	ABCDF	ABG	BCEH	CFG	AEFH	ACDEGH	BDEFGH
E	ABCEF	ABDEG	BCDH	CDEFG	ADFH	ACGH	BFGH
F	ABC	ABDFG	BCDEFH	CDG	ADEH	ACEFGH	BEGH
G	ABCFG	ABD	BCDEGH	CDF	ADEFGH	ACEH	BEFH
н	ABCFH	ABDGH	BCDE	CDFGH	ADEF	ACEG	BEFG
AB	CF	DG	ACDEH	ABCDFG	BDEFH	BCEGH	AEFGH
AC	BF	BCDG	ABDEH	ADFG	CDEFH	EGH	ABCEFGH
AD	BCDF	BG	ABCEH	ACFG	EFH	CDEGH	ABDEFGH
AE	BCEF	BDEG	ABCDH	ACDEFG	DFH	CGH	ABFGH
AF	BC	BDFG	ABCDEFH	ACDG	DEH	CEFGH	ABEGH
AG	BCFG	BD	ABCDEGH	ACDF	DEFGH	CEH	ABEFH
АН	BCFH	BDGH	ABCDE	ACDFGH	DEF	CEG	ABEFG
BE	ACEF	ADEG	CDH	BCDEFG	ABDFH	ABCGH	FGH
ВН	ACFH	ADGH	CDE	BCDFGH	ABDEF	ABCEG	EFG
CD	ABDF	ABCG	BEH	FG	ACEFH	ADEGH	BCDEFGH
CE	ABEF	ABCDEG	BDH	DEFG	ACDFH	AGH	BCFGH
CG	ABFG	ABCD	BDEGH	DF	ACDEFGH	AEH	BCEFH
СН	ABFH	ABCDGH	BDE	DFGH	ACDEF	AEG	BCEFG
DE	ABCDEF	ABEG	BCH	CEFG	AFH	ACDGH	BDFGH
DH	ABCDFH	ABGH	BCE	CFGH	AEF	ACDEG	BDEFG
EF	ABCE	ABDEFG	BCDFH	CDEG	ADH	ACFGH	BGH
EG	ABCEFG	ABDE	BCDGH	CDEF	ADFGH	ACH	BFH
EH	ABCEFH	ABDEGH	BCD	CDEFGH	ADF	ACG	BFG
FH	ABCH	ABDFGH	BCDEF	CDGH	ADE	ACEFG	BEG
GH	ABCFGH	ABDH	BCDEG	CDFH	ADEFG	ACE	BEF
ABE	CEF	DEG	ACDH	ABCDEFG	BDFH	BCGH	AFGH
ABH	CFH	DGH	ACDE	ABCDFGH	BDEF	BCEG	AEFG
ACD	BDF	BCG	ABEH	AFG	CEFH	DEGH	ABCDEFGH

Problem VI: Figure 2

The GLM Procedure

Dependent Variable: Y

Parameter	Estimate	Standard Error	t Value	Pr > t
v1	0.14500000	-		
v2	0.08750000			
v3	0.03750000			
v4	-0.03750000			
v5	-0.47000000			
v1*v2	0.03000000			
v1*v3	0.19000000			
v1*v4	0.06000000	-		
v1*v5	-0.30500000			
v2*v3	-0.13500000			
v2*v4	0.32500000			
v2*v5	-0.81000000			
v3*v4	0.14500000			
v3*v5	0.27000000			
v4*v5	-0.63000000			