TABLE 17.3 **Cornell Medical Index scores for a sample of women from different households in four turnkey housing neighborhoods**

Neighborhood	No. of Households	% Blacks in Surrounding Neighborhoods	Sample Size (n_i)	Observations (Y_{ij})	Total (T_i)	Sample Mean ($\overline{Y}_{i\cdot}$)
Cherryview	98	17	25	49, 12, 28, 24, 16, 28, 21, 48, 30, 18, 10, 10, 15, 7, 6, 11, 13, 17, 43, 18, 6, 10, 9, 12, 12	$T_1 = 473$	$\overline{Y}_{1\cdot} = 18.92$
Morningside	211	100	25	5, 1, 44, 11, 4, 3, 14, 2, 13, 68, 34, 40, 36, 40, 22, 25, 14, 23, 26, 11, 20, 4, 16, 25, 17	$T_2 = 518$	$\overline{Y}_{2\cdot} = 20.72$
Northhills	212	36	25	20, 31, 19, 9, 7, 16, 11, 17, 9, 14, 10, 5, 15, 19, 29, 23, 70, 25, 6, 62, 2, 14, 26, 7, 55	$T_3 = 521$	$\overline{Y}_{3\cdot} = 20.84$
Easton	40	65	25	13, 10, 20, 20, 22, 14, 10, 8, 21, 35, 17, 23, 17, 23, 83, 21, 17, 41, 20, 25, 49, 41, 27, 37, 57	$T_4 = 671$	$\overline{Y}_{4\cdot} = 26.84$
			$\sum_{i=1}^{4} n_i = 100$		$G = 2,183$	$\overline{Y} = 21.83$

The GLM Procedure

Class Level Information

Class	Levels	Values
NBRHOOD	4	1 2 3 4

Number of Observations Read	100
Number of Observations Used	100

Dependent Variable: CMI

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	894.51000	298.17000	1.18	0.3223
Error	96	24301.60000	253.14167		
Corrected Total	99	25196.11000			

F Statistic

P-Value for F test

MST

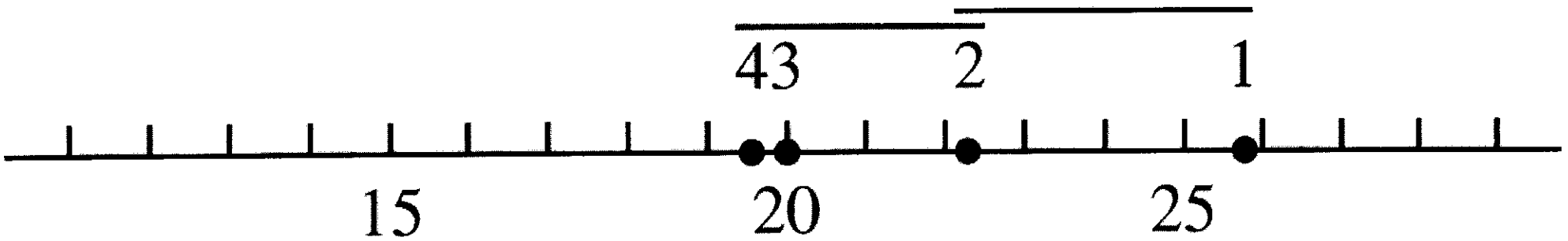
MSE

TABLE 17.4 General ANOVA table for one-way ANOVA (k populations)

Source	d.f.	SS	MS	F
Between	$k - 1$	SST	$\text{MST} = \dfrac{\text{SST}}{k - 1}$	$\dfrac{\text{MST}}{\text{MSE}}$
Within	$n - k$	SSE	$\text{MSE} = \dfrac{\text{SSE}}{n - k}$	
Total	$n - 1$	SSY		

TABLE 17.7 Potencies (dosages at death) of four cardiac substances

Substance	Sample Size (n_i)	Dosage at Death (Y_{ij})	Total	Sample Mean ($\overline{Y}_i$)	Sample Variance (S_i^2)
1	10	29, 28, 23, 26, 26, 19, 25, 29, 26, 28	259	25.9	9.4333
2	10	17, 25, 24, 19, 28 21, 20, 25, 19, 24	222	22.2	12.1778
3	10	17, 16, 21, 22, 23 18, 20, 17, 25, 21	200	20.0	8.6667
4	10	18, 20, 25, 24, 16 20, 20, 17, 19, 17	196	19.6	8.7111



The GLM Procedure

Tukey's Studentized Range (HSD) Test for DOSAGE

Alpha	0.05
Error Degrees of Freedom	36
Error Mean Square	9.747222
Critical Value of Studentized Range	3.80880
Minimum Significant Difference	3.7604

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	SUBSTANCE
A	25.900	10	1
A			
B A	22.200	10	2
B			
B	20.000	10	3
B			
B	19.600	10	4

The GLM Procedure

Scheffe's Test for DOSAGE

NOTE: This test controls the Type I experimentwise error rate.

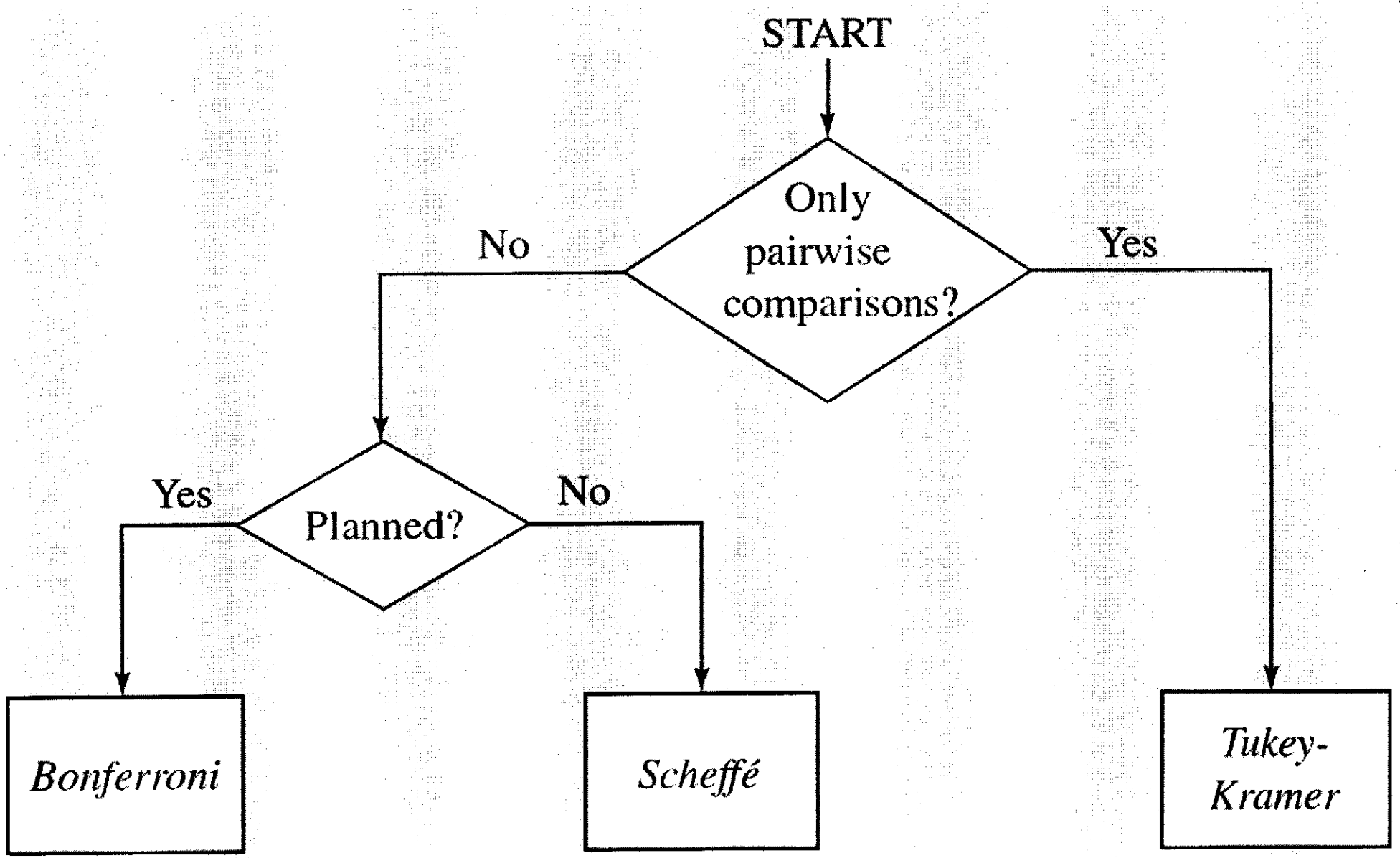
Alpha	0.05
Error Degrees of Freedom	36
Error Mean Square	9.747222
Critical Value of F	2.86627
Minimum Significant Difference	4.0942

Means with the same letter are not significantly different.

Scheffe Grouping	Mean	N	SUBSTANCE
A	25.900	10	1
A			
B A	22.200	10	2
B			
B	20.000	10	3
B			
B	19.600	10	4

TABLE 17.9 Comparison of some Tukey-Kramer and Scheffé confidence intervals for the potency data of Table 17.7

Pairwise Comparison	Tukey-Kramer		Schéffé	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit
$\mu_1 - \mu_4$	2.538	10.062	2.206	10.394
$\mu_1 - \mu_3$	2.138	9.662	1.806	9.999
$\mu_1 - \mu_2$	−0.062	7.462	−0.394	7.774
$\mu_2 - \mu_4$	−1.162	6.362	−1.494	6.694
$\mu_2 - \mu_3$	−1.562	5.962	−1.894	6.294
$\mu_3 - \mu_4$	−3.362	4.162	−3.694	4.494



Factor 2

Factor 1			
	Y	Y	Y
	Y	Y	Y
	Y	Y	Y
	Y	Y	Y

(a) Single Observation per Cell ($n_{ij} = 1$)

Factor 2

Factor 1			
	YYYY	YYYY	YYYY
	YYYY	YYYY	YYYY
	YYYY	YYYY	YYYY
	YYYY	YYYY	YYYY

(b) Equal Replications per Cell ($n_{ij} = 4$)

Factor 2

Factor 1				
	YYYY	YY	YYY	$n_{1\cdot} = 9$
	YYYY	YY	YYY	$n_{2\cdot} = 9$
	YYYY	YY	YYY	$n_{3\cdot} = 9$
	YYYY	YY	YYY	$n_{4\cdot} = 9$
	$n_{\cdot 1} = 16$	$n_{\cdot 2} = 8$	$n_{\cdot 3} = 12$	

(c) Equal Replications by Column and Proportionate Replications by Row ($n_{ij} = n_{\cdot j}/4$)

Factor 2

Factor 1				
	YYYY	YY	YYY	$n_{1\cdot} = 9$
	YYYY YYYY	YY YY	YYY YYY	$n_{2\cdot} = 18$
	YYYY YYYY YYYY	YY YY YY	YYY YYY YYY	$n_{3\cdot} = 27$
	YYYY YYYY	YY YY	YYY YYY	$n_{4\cdot} = 18$
	$n_{\cdot 1} = 32$	$n_{\cdot 2} = 16$	$n_{\cdot 3} = 24$	$n_{\cdot\cdot} = 72$

(d) Proportionate Row and Column Replications ($n_{ij} = n_{i\cdot}n_{\cdot j}/n_{\cdot\cdot}$)

Factor 2

Factor 1				
	YY	YYY	YYY YYY	$n_{1\cdot} = 11$
	YYY	YYYY	YY	$n_{2\cdot} = 9$
	Y	YYY	YYYY	$n_{3\cdot} = 8$
	YYYYY	YY	Y	$n_{4\cdot} = 8$
	$n_{\cdot 1} = 11$	$n_{\cdot 2} = 12$	$n_{\cdot 3} = 13$	$n_{\cdot\cdot} = 36$

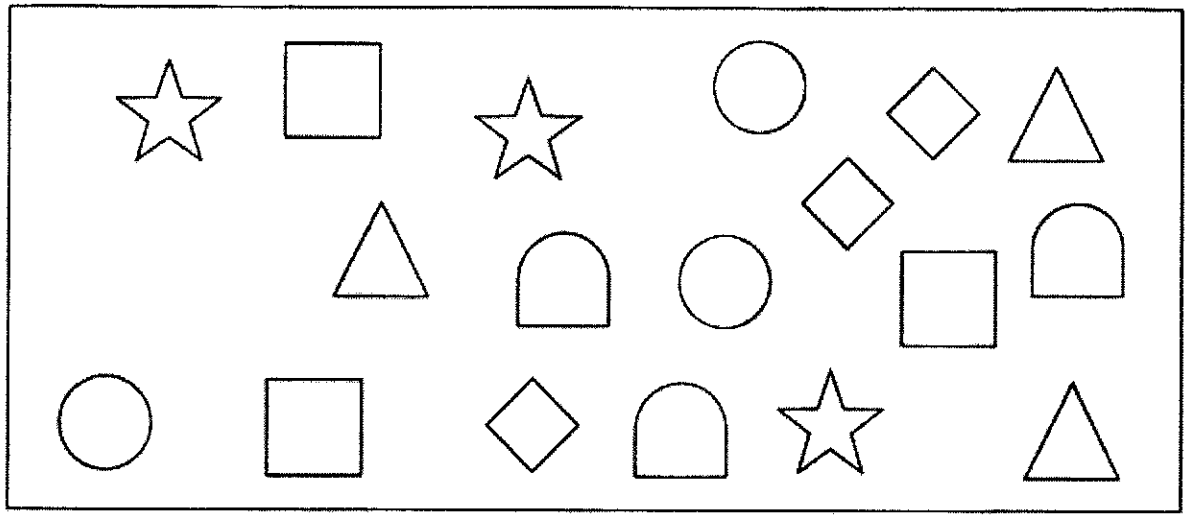
(e) Nonsystematic Replications

TABLE 18.1 **Matched-pairs design involving change scores in self-perception of health (Y) among hypertensives**

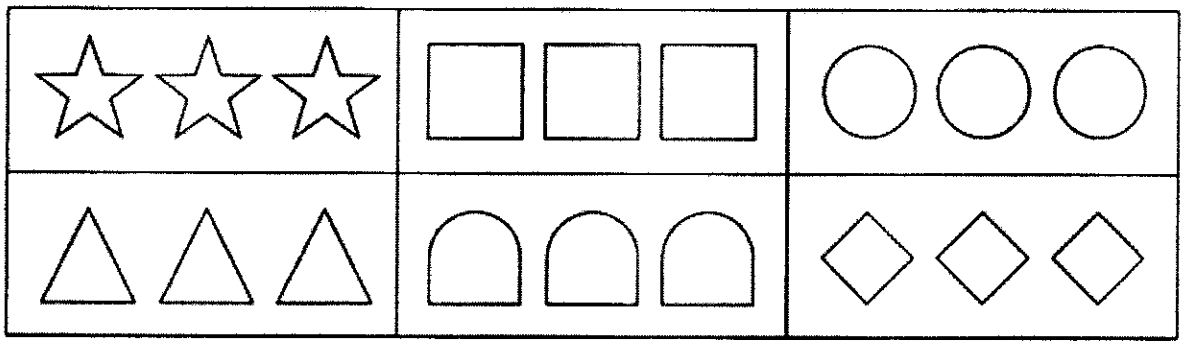
	Pair																
Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	Mean
Treatment	10	12	8	8	13	11	15	16	4	13	2	15	5	6	8	146	9.73
Control	6	5	7	9	10	12	9	8	3	14	6	10	1	2	1	103	6.87
Total	16	17	15	17	23	23	24	24	7	27	8	25	6	8	9	249	8.30
Difference	4	7	1	−1	3	−1	6	8	1	−1	−4	5	4	4	7	43	2.86

TABLE 18.2 ANOVA table for matched-pairs data of Table 18.1

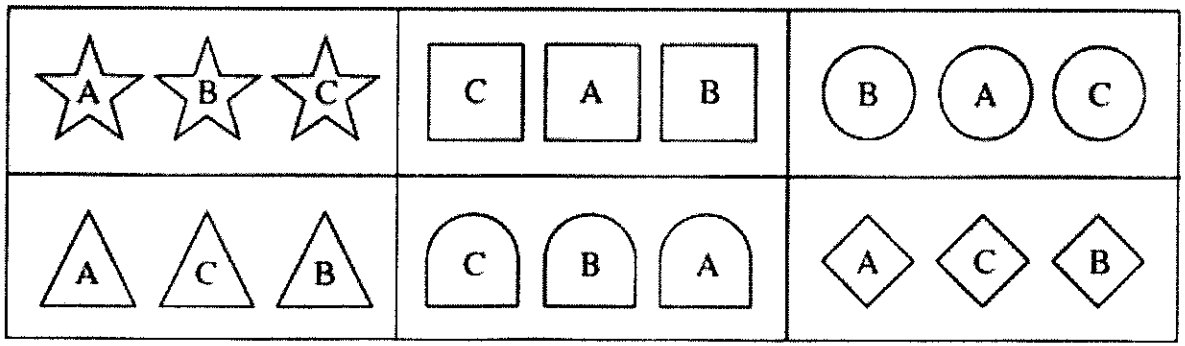
Source	SS	d.f.	MS	F
Treatment	61.63	1	61.63	9.71 ($.005 < P < .01$)
Pairs (blocks)	391.80	14	27.99	4.41 ($.001 < P < .005$)
Error	88.87	14	6.35	
Total	542.30	29		



(a) Heterogeneous Experimental Units



(b) Formation of Blocks



(c) Randomization of Treatments A, B, and C Within Each Block

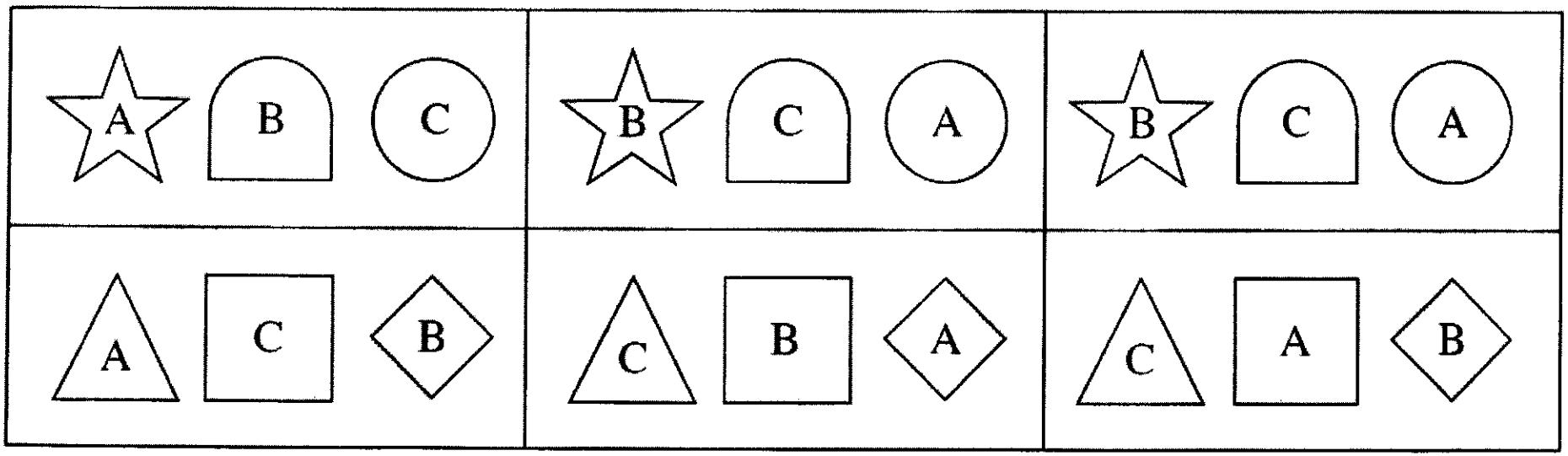


TABLE 18.4 Randomized-blocks experiment for comparing the effects of four cholesterol-reducing diets on persons with hypercholesterolemia (Y = reduction in cholesterol level after one year)

Treatment (Diet)	Block 1 (Male, Age > 50, QUET >3.5)	2 (Male, Age > 50, QUET <3.5)	3 (Male, Age < 50, QUET >3.5)	4 (Male, Age < 50, QUET <3.5)	5 (Female, Age > 50, QUET >3.5)	6 (Female, Age > 50, QUET <3.5)	7 (Female, Age < 50, QUET >3.5)	8 (Female, Age < 50, QUET <3.5)	Total	Mean
1	11.2	6.2	16.5	8.4	14.1	9.5	21.5	13.2	100.6	12.58
2	9.3	4.1	14.2	6.9	14.2	8.9	15.2	10.1	82.9	10.36
3	10.4	5.1	14.0	6.2	11.1	8.4	17.3	11.2	83.7	10.46
4	9.0	4.9	13.7	6.1	11.8	8.4	15.9	9.7	79.5	9.94
Total	39.9	20.3	58.4	27.6	51.2	35.2	69.9	44.2	346.7	—
Mean	9.98	5.08	14.60	6.90	12.80	8.80	17.48	11.05	—	10.83

TABLE 18.5 ANOVA table for a randomized-blocks experiment with k treatments and b blocks

Source	d.f.	SS	MS	F
Treatments	$k - 1$	SST	$\text{MST} = \dfrac{\text{SST}}{k - 1}$	$\dfrac{\text{MST}}{\text{MSE}}$
Blocks	$b - 1$	SSB	$\text{MSB} = \dfrac{\text{SSB}}{b - 1}$	$\dfrac{\text{MSB}}{\text{MSE}}$
Error	$(k - 1)(b - 1)$	SSE	$\text{MSE} = \dfrac{\text{SSE}}{(k - 1)(b - 1)}$	
Total	$kb - 1$	SSY		

Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
blk	8	1 2 3 4 5 6 7 8

SSE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	496.4206250	49.6420625	52.89	<.0001
Error	21	19.7115625	0.9386458 ← MSE		
Corrected Total	31	516.1321875 ← SSY			

R-Square	Coeff Var	Root MSE	y Mean
0.961809	8.942254	0.968837	10.83438

F Statistics

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	33.5609375 (SST)	11.1869792 (MST)	11.92	<.0001
blk	7	462.8596875 (SSB)	66.1228125 ← MSB	70.44	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	33.5609375	11.1869792	11.92	<.0001
blk	7	462.8596875	66.1228125	70.44	<.0001