

MATH 204: PRINCIPLES OF STATISTICS 2
WINTER 2026
ANOVA TABLES FOR THE RANDOMIZED BLOCK DESIGN

1. **No interaction case**

Use the given information to complete the ANOVA tables in the format

SOURCE	DF	SS	MS	F
TREATMENTS	$k - 1$	SST	MST	F_1
BLOCKS	$b - 1$	SSB	MSB	F_2
ERROR	$n - b - k + 1$	SSE	MSE	
TOTAL	$n - 1$	SS		

and complete the F-tests for the following analyses using statistical tables. As usual

- k is the number of levels of the treatment factor
- b is the number of levels of the blocking factor
- r is the number of replicates, which is the same for all treatment/blocking factor level combinations.

(i) Summary data: $k = 7, b = 5, r = 4$

$$SST = 8.134 \quad SSB = 22.924 \quad SSE = 130.764$$

(ii) Summary data: $k = 5, b = 3, r = 2$

$$SST = 7.109 \quad SSB = 16.986 \quad SSE = 123.551$$

(iii) Summary data: $k = 8, b = 5, r = 1$

$$SST = 11.127 \quad SSB = 26.436 \quad SSE = 138.078$$

(iv) Summary data: $k = 8, b = 4, r = 6$

$$SST = 10.502 \quad SSB = 14.969 \quad SSE = 127.899$$

(v) Summary data: $k = 7, b = 3, r = 2$

$$SST = 10.183 \quad SSB = 24.842 \quad SSE = 107.638$$

(vi) Summary data: $k = 6, b = 4, r = 5$

$$SST = 4.841 \quad SSB = 21.488 \quad SSE = 145.143$$

2. Interaction case

Use the given information to complete the ANOVA tables in the format

SOURCE	DF	SS	MS	F
TREATMENTS	$k - 1$	SST	MST	F_1
BLOCKS	$b - 1$	SSB	MSB	F_2
INTERACTION	$(b - 1)(k - 1)$	SSI	MSI	F_3
ERROR	$n - bk$	SSE	MSE	
TOTAL	$n - 1$	SS		

and complete the F-tests for the following analyses using statistical tables or software.

(i) Summary data: $k = 7, b = 4, r = 2$

$$SST = 12.291 \quad SSB = 20.793 \quad SSI = 23.839 \quad SSE = 34.913$$

(ii) Summary data: $k = 8, b = 3, r = 5$

$$SST = 23.885 \quad SSB = 20.927 \quad SSI = 19.736 \quad SSE = 38.575$$

(iii) Summary data: $k = 5, b = 4, r = 2$

$$SST = 11.190 \quad SSB = 20.909 \quad SSI = 23.154 \quad SSE = 46.836$$

(iv) Summary data: $k = 6, b = 3, r = 4$

$$SST = 21.650 \quad SSB = 20.212 \quad SSI = 19.309 \quad SSE = 52.366$$

(v) Summary data: $k = 6, b = 3, r = 2$

$$SST = 8.132 \quad SSB = 4.748 \quad SSI = 33.504 \quad SSE = 43.252$$

(vi) Summary data: $k = 8, b = 4, r = 4$

$$SST = 10.752 \quad SSB = 14.997 \quad SSI = 14.404 \quad SSE = 65.453$$

Solutions:

1. No interaction case

(i) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	6	12.291	2.048	1.643
BLOCKS	3	20.793	6.931	5.559
ERROR	46	34.913	1.247	
TOTAL	55	47.203		

Treatment Critical value: 2.30 $\therefore$ Do not reject H_0

Blocks Critical value: 2.81 $\therefore$ Reject H_0

(ii) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	7	23.885	3.412	8.492
BLOCKS	2	20.927	10.464	26.040
ERROR	110	38.575	0.402	
TOTAL	119	62.461		

Treatment Critical value: 2.09 $\therefore$ Reject H_0

Blocks Critical value: 3.08 $\therefore$ Reject H_0

(iii) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	4	11.190	2.797	1.195
BLOCKS	3	20.909	6.970	2.976
ERROR	32	46.836	2.342	
TOTAL	39	58.026		

Treatment Critical value: 2.67 $\therefore$ Do not reject H_0

Blocks Critical value: 2.90 $\therefore$ Reject H_0

(iv) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	5	21.650	4.330	4.465
BLOCKS	2	20.212	10.106	10.421
ERROR	64	52.366	0.970	
TOTAL	71	74.016		

Treatment Critical value: 2.36 $\therefore$ Reject H_0

Blocks Critical value: 3.14 $\therefore$ Reject H_0

(v) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	5	8.132	1.626	0.677
BLOCKS	2	4.748	2.374	0.988
ERROR	28	43.252	2.403	
TOTAL	35	51.384		

Treatment Critical value: 2.56 $\therefore$ Do not reject H_0

Blocks Critical value: 3.34 $\therefore$ Do not reject H_0

(vi) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	7	10.752	1.536	2.253
BLOCKS	3	14.997	4.999	7.332
ERROR	117	65.453	0.682	
TOTAL	127	76.205		

Treatment Critical value: 2.09 $\therefore$ Reject H_0

Blocks Critical value: 2.68 $\therefore$ Reject H_0

2. Interaction case

(i) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	6	12.291	2.048	1.643
BLOCKS	3	20.793	6.931	5.559
INTERACTION	18	23.839	1.324	1.062
ERROR	28	34.913	1.247	
TOTAL	55	47.203		

Treatment Critical value: 2.30 $\therefore$ Do not reject H_0

Blocks Critical value: 2.81 $\therefore$ Reject H_0

Interaction Critical value: 1.99 $\therefore$ Do not reject H_0

(ii) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	7	23.885	3.412	8.492
BLOCKS	2	20.927	10.464	26.040
INTERACTION	14	19.736	1.410	3.508
ERROR	96	38.575	0.402	
TOTAL	119	62.461		

Treatment Critical value: 2.09 $\therefore$ Reject H_0

Blocks Critical value: 3.08 $\therefore$ Reject H_0

Interaction Critical value: 1.80 $\therefore$ Reject H_0

(iii) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	4	11.190	2.797	1.195
BLOCKS	3	20.909	6.970	2.976
INTERACTION	12	23.154	1.929	0.824
ERROR	20	46.836	2.342	
TOTAL	39	58.026		

Treatment Critical value: 2.67 $\therefore$ Do not reject H_0

Blocks Critical value: 2.90 $\therefore$ Reject H_0

Interaction Critical value: 2.28 $\therefore$ Do not reject H_0

(iv) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	5	21.650	4.330	4.465
BLOCKS	2	20.212	10.106	10.421
INTERACTION	10	19.309	1.931	1.991
ERROR	54	52.366	0.970	
TOTAL	71	74.016		

Treatment Critical value: 2.36 $\therefore$ Reject H_0

Blocks Critical value: 3.14 $\therefore$ Reject H_0

Interaction Critical value: 2.01 $\therefore$ Do not reject H_0

(v) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	5	8.132	1.626	0.677
BLOCKS	2	4.748	2.374	0.988
INTERACTION	10	33.504	3.350	1.394
ERROR	18	43.252	2.403	
TOTAL	35	51.384		

Treatment Critical value: 2.56 $\therefore$ Do not reject H_0

Blocks Critical value: 3.34 $\therefore$ Do not reject H_0

Interaction Critical value: 2.41 $\therefore$ Do not reject H_0

(vi) ANOVA table

SOURCE	DF	SS	MS	F
TREATMENTS	7	10.752	1.536	2.253
BLOCKS	3	14.997	4.999	7.332
INTERACTION	21	14.404	0.686	1.006
ERROR	96	65.453	0.682	
TOTAL	127	76.205		

Treatment Critical value: 2.09 $\therefore$ Reject H_0

Blocks Critical value: 2.68 $\therefore$ Reject H_0

Interaction Critical value: 1.67 $\therefore$ Do not reject H_0