

Supplementary Materials of STA305 Final Project

Factorial Design for Factors Affecting Total Tourist Expenditure

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Table 1: Values of effects and interactions in data simulation.

Term	Inputted value
grand mean	500
a	1050
b	900
ab	700
c	800
ac	500
bc	110
abc	60
d	850
ad	550
bd	130
abd	85
cd	100
acd	80
bcd	70
abcd	10

Table 2: Summary of the initial model.

	Coefficient Estimate	Standard Error	Effect Estimate	p-Value
(Intercept)	536.156	48.612	-	0.000
A1	969.365	72.103	1938.73	0.000
B1	912.226	72.103	1824.451	0.000
C1	778.708	72.103	1557.415	0.000
D1	838.290	72.103	1676.58	0.000
A1:B1	745.569	102.547	1491.138	0.000
A1:C1	556.524	102.547	1113.048	0.000
B1:C1	169.694	102.547	339.387	0.103
A1:D1	637.884	102.547	1275.768	0.000
B1:D1	129.816	102.547	259.632	0.210
C1:D1	169.759	102.547	339.518	0.103
A1:B1:C1	-91.668	144.206	-183.336	0.527
A1:B1:D1	-14.320	144.206	-28.639	0.921
A1:C1:D1	37.996	144.206	75.991	0.793
B1:C1:D1	-0.936	144.206	-1.872	0.995
A1:B1:C1:D1	71.987	199.249	143.975	0.719

Table 3: Analysis of Variance for new model with only active effects and interactions.

	Degree of freedom	Sum of squares	Mean sum of squares	F value	p-Value
block	1	519.3821	519.3821	0.046547	0.829831
A	1	74602537.3072	74602537.3072	6685.838277	0.000000
B	1	40159610.4147	40159610.4147	3599.082152	0.000000
C	1	29867737.0076	29867737.0076	2676.730129	0.000000
D	1	34937962.8481	34937962.8481	3131.120975	0.000000
A:B	1	2524562.2988	2524562.2988	226.249882	0.000000
A:C	1	1499792.4468	1499792.4468	134.410572	0.000000
A:D	1	2229242.4287	2229242.4287	199.783478	0.000000
B:C	1	99953.5509	99953.5509	8.957782	0.003849
B:D	1	98258.9242	98258.9242	8.805911	0.004142
C:D	1	212768.4307	212768.4307	19.068189	0.000044
Residuals	68	758763.8717	11158.2922	NA	NA

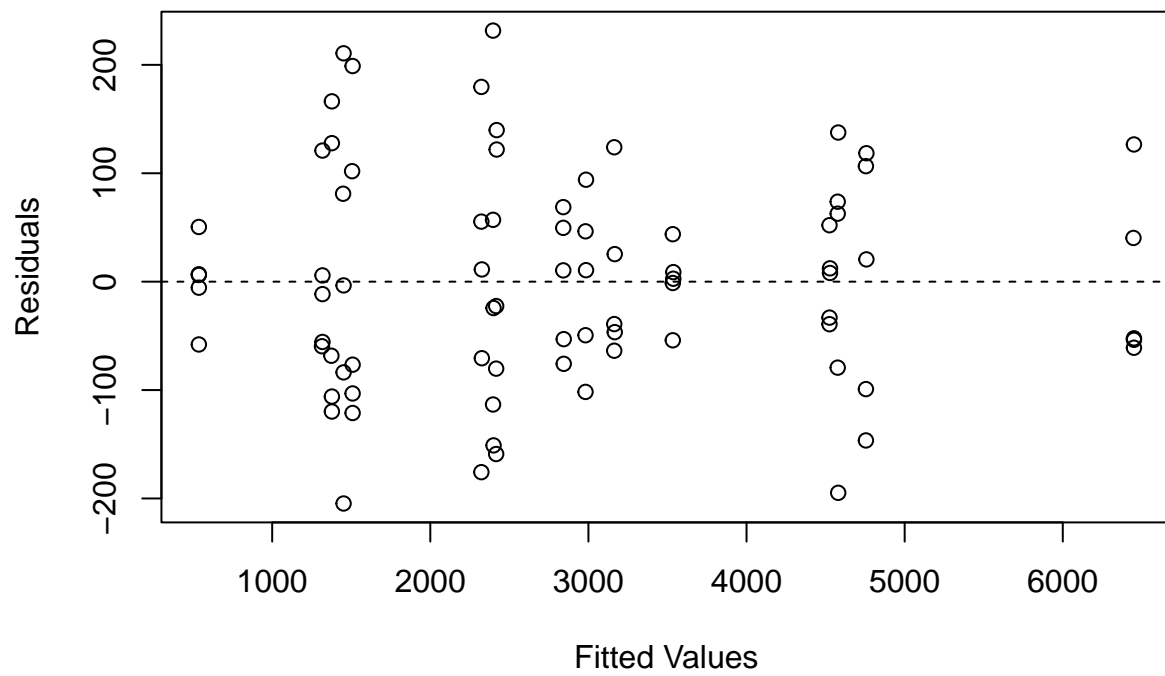


Figure 1: Residuals vs. Fitted for the initial model

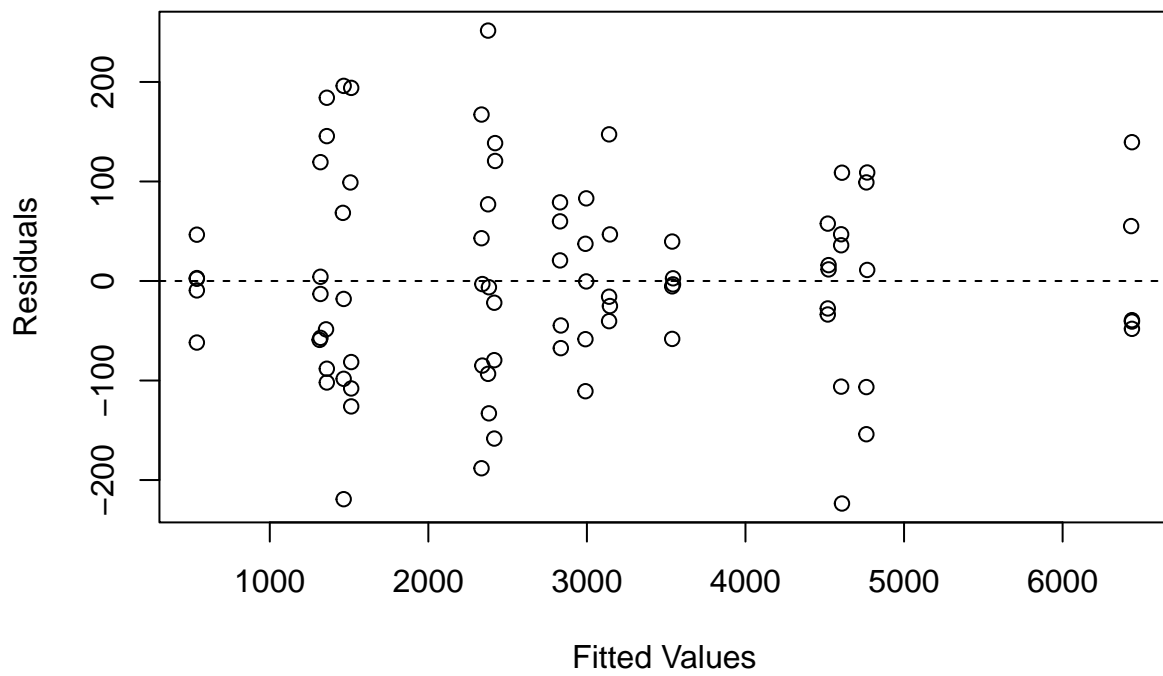


Figure 2: Residuals vs. Fitted for new model

Simulated data

Table 4: Simulated Data

run	combination	A	B	C	D	block	response
1	(1)	-1	-1	-1	-1	1	530.6164
2	a	1	-1	-1	-1	2	1432.0792
3	b	-1	1	-1	-1	2	1367.8290
4	ab	1	1	-1	-1	1	3124.1722
5	c	-1	-1	1	-1	2	1438.9329
6	ac	1	-1	1	-1	1	2909.5095
7	bc	-1	1	1	-1	1	2453.8360
8	abc	1	1	1	-1	2	4384.9313
9	d	-1	-1	-1	1	2	1271.6233
10	ad	1	-1	-1	1	1	3028.1330
11	bd	-1	1	-1	1	1	2393.9898
12	abd	1	1	-1	1	2	4876.6031
13	cd	-1	-1	1	1	1	2147.1847
14	acd	1	-1	1	1	2	4535.8421
15	bcd	-1	1	1	1	2	3539.5570
16	abcd	1	1	1	1	1	6487.3672
17	(1)	-1	-1	-1	-1	1	586.6138
18	a	1	-1	-1	-1	2	1707.5795
19	b	-1	1	-1	-1	2	1662.1928
20	ab	1	1	-1	-1	1	3099.6066
21	c	-1	-1	1	-1	2	1306.5101
22	ac	1	-1	1	-1	1	2851.1600
23	bc	-1	1	1	-1	1	2628.3752
24	abc	1	1	1	-1	2	4717.3009
25	d	-1	-1	-1	1	1	1306.1108
26	ad	1	-1	-1	1	2	3078.8930
27	bd	-1	1	-1	1	2	2541.5133
28	abd	1	1	-1	1	1	4655.8816
29	cd	-1	-1	1	1	2	2255.4351
30	acd	1	-1	1	1	1	4485.4409
31	bcd	-1	1	1	1	1	3479.6492
32	abcd	1	1	1	1	2	6397.9300
33	(1)	-1	-1	-1	-1	1	542.3333
34	a	1	-1	-1	-1	2	1405.5487
35	b	-1	1	-1	-1	2	1246.8947
36	ab	1	1	-1	-1	1	3287.3072
37	c	-1	-1	1	-1	1	1255.2750
38	ac	1	-1	1	-1	2	2768.1182
39	bc	-1	1	1	-1	2	2375.6047
40	abc	1	1	1	-1	1	4497.2659
41	d	-1	-1	-1	1	2	1505.3587
42	ad	1	-1	-1	1	1	2932.2828
43	bd	-1	1	-1	1	1	2257.4913
44	abd	1	1	-1	1	2	4778.6810
45	cd	-1	-1	1	1	2	2337.3456
46	acd	1	-1	1	1	1	4576.7612
47	bcd	-1	1	1	1	1	3577.4928
48	abcd	1	1	1	1	2	6576.7591

Table 4: Simulated Data (*continued*)

run	combination	A	B	C	D	block	response
49	(1)	-1	-1	-1	-1	1	542.9976
50	a	1	-1	-1	-1	2	1387.5248
51	b	-1	1	-1	-1	1	1529.4769
52	ab	1	1	-1	-1	2	3191.8742
53	c	-1	-1	1	-1	2	1262.3909
54	ac	1	-1	1	-1	1	2890.3863
55	bc	-1	1	1	-1	2	2248.8997
56	abc	1	1	1	-1	1	4639.3065
57	d	-1	-1	-1	1	2	1543.9194
58	ad	1	-1	-1	1	1	2880.0122
59	bd	-1	1	-1	1	2	2559.4644
60	abd	1	1	-1	1	1	4861.5284
61	cd	-1	-1	1	1	1	2502.5659
62	acd	1	-1	1	1	2	4540.1280
63	bcd	-1	1	1	1	1	3532.4813
64	abcd	1	1	1	1	2	6389.2257
65	(1)	-1	-1	-1	-1	1	478.2197
66	a	1	-1	-1	-1	1	1607.4460
67	b	-1	1	-1	-1	2	1448.0888
68	ab	1	1	-1	-1	2	3119.9034
69	c	-1	-1	1	-1	2	1323.7828
70	ac	1	-1	1	-1	2	2790.8748
71	bc	-1	1	1	-1	1	2283.4860
72	abc	1	1	1	-1	1	4650.3451
73	d	-1	-1	-1	1	2	1257.7919
74	ad	1	-1	-1	1	2	2995.4405
75	bd	-1	1	-1	1	1	2336.2659
76	abd	1	1	-1	1	1	4608.5206
77	cd	-1	-1	1	1	1	2378.3179
78	acd	1	-1	1	1	1	4491.5191
79	bcd	-1	1	1	1	2	3545.6638
80	abcd	1	1	1	1	2	6396.5344