1. The yield of treatments in different plots is shown in the following plots. Carry out analysis

D 1401	C 2536	C 2459	A 2537	C 2827	A 2069
B 2211	A 1797	D 1170	D 1516	D 2104	C 2385
B 3366	A 2104	B 2591	C 2460	D 1077	B 2544

Q12

Working expression:

$$F_T = \frac{MST}{MSE}$$

$$MST = \frac{SST}{a-1}$$

$$MSB = \frac{B}{b-1}$$

$$MSE = \frac{SSE}{(a-1)(b-1)}$$

Working procedure:

Define treatments (values A, B, C, D) and values in variable view → Assign type as numeric → Assign values 1 for A, 2 for B, 3 for C, 4 for D → Assign measure in nominal for treatment and scale for values→ Insert data in data view → Analyze → compare means → one way ANOVA → Put value in dependent list → Put treatment in factor→ post HOC→ LSD → continue → OK.

SPSS Output :

ANOVA

values

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4265689.961	3	1421896.654	11.253	.001
Within Groups	1768941.150	14	126352.939		
Total	6034631.111	17			

Testing procedure:

Setting up Hypothesis:

H_0: There is no significance difference between treatments

H_1: There is significance difference between treatments

Level of significance:

$\alpha = 0.05$

Decision:

For treatment, $p = 0.001 < \alpha = 0.05$, Hence we accept H_1 and H_0 is rejected

Conclusion:

Hence, we conclude that there is significant difference between treatments.

2080-12-22

2. The following information has been gathered from a random sample of apartment renters in a city. We are trying to predict rent (in dollars per month) based on the size of apartment (number of rooms) and distance from downtown (in miles)

Rent (Dollar)	360	1000	450	525	350	300
Number of rooms	2	6	3	4	2	1
Distance from downtown	1	1	2	3	10	4

i. Obtain the multiple regression models that best relate these variables

ii. If someone is looking for a two bed apartment 2 miles from downtown, what rent should he expect to pay?

iii. Compute the multiple determination and standard error of the estimate.

Q9)

Working Expression:

The regression line of Y on X1 and X2 is

Y = a + b1x1 + b2x2

Where, Y= dependent variable

A = y-intercept

B1 and b2 are regression coefficients

X1 and x2 are independent variable

Working Procedure:

Define variables in variable view -> Put data in variable view -> Analyze -> Regression -> Linear -> Put rent in dependent list -> Put room and distance in independent -> Goto statistics -> Level of confidence interval 95% -> continue -> ok

SPSS OUTPUT:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957[a]	.916	.859	97.086

a. Predictors: (Constant), Distance from downtown, Number of rooms

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	96.458	118.121		.817	.474	-279.454	472.371
	Room	136.485	26.864	.943	5.081	.015	50.991	221.978
	Distance from towndown	-2.403	14.171	-.031	-.170	.876	-47.502	42.695

a. Dependent Variable: Rent(dollar)

Calculation:

Here, a = 96.45

b1 = 136.185

b2 = -2.403

The multiple model is

Y = a + b1x1 + b2x2

$= 96.45 + 136.185x1 - 2.4x2$

b) When x1 =2, x2 = 2, Y=?

$Y = 96.45 + 136.18*1 - 2.4*2$

$= 96.45 + 136.18*2 - 2.4*2$

= 364.01

c)Multiple determination (R) = 0.196

= 91. 6%

Which means that 91.6% of variation of dependent variable rent is explained by two independent rooms and distance

c-ii) Standard error of estimation is 97.08.

Conclusion:

In general, in this way we can obtain the estimated value of rent, coefficient of determination and standard error from the given data.

29-03-19

3. The layout and yield of four treatments in a 4×4 Latin Square Design is shown in the following table. Analyze the data

D 20	B 17	A 20	C 19
B 21	A 18	C 18	D 17
A 18	C 21	D 17	B 17
C 20	D 19	B 17	A 18

Working expression:

$F_R = \frac{MSR}{MSE}$ $\quad$ $MSR = \frac{SSR}{m-1}$

$F_C = \frac{MSC}{MSE}$ $\quad$ $MSC = \frac{SSC}{m-1}$

$F_T = \frac{MST}{MSE}$ $\quad$ $MST = \frac{SST}{m-1}$

$MSE = \frac{SSE}{(m-1)(m-2)}$

Working procedure:

Define variable in Name (Row, Column, Treatment, Value) → Make Treatment to string and other Numeric→ Give decimal 1 for Values other 0→Make Label same as Name→ Make it all align to center→ Measure for all scale except put treatment in Nominal→ Analyze → General linear model → Univariate → Put values in the dependent variable → Put row, column and treatment in fixed factors → Click model → Go to custom → row, column and treatment in factor and covariates send to model → Type main effects → Sum of square type III → continue → click post Hoc → Send row, column and treatment in factors in Post Hoc tests for → click LSD → continue → ok → Copy only ANOVA table in word file

SPSS Output:

Tests of Between-Subjects Effects

Dependent Variable: values

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	16.063[a]	9	1.785	.675	.714
Intercept	5513.063	1	5513.063	2083.677	.000
Row	1.188	3	.396	.150	.926
Column	9.688	3	3.229	1.220	.381
Treatment	5.188	3	1.729	.654	.609
Error	15.875	6	2.646		
Total	5545.000	16			
Corrected Total	31.938	15			

a. R Squared = .503 (Adjusted R Squared = -.243)

Testing procedure:

Setting up Hypothesis

H_0: There is no significance difference between rows, columns, and treatments.

H_1: There is significance difference between rows, columns, and treatments.

Level of significance

$\alpha=0.05$

Decision

For row, $p = 0.926 > \alpha = 0.05$, Hence we accept H_0 and H_1 is rejected

For column, $p = 0.381 > \alpha = 0.05$, Hence we accept H_0 and H_1 is rejected.

For treatment, $p = 0.609 > \alpha = 0.05$, Hence we accept H_0 and H_1 is rejected.

Conclusion:

Hence, we conclude that there is no significant difference between rows, columns, and treatments.

12-22