6)Latin square.

6.1)model:

$$X_{ijkl} = \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\beta\gamma)_{jk} + (\alpha\beta\gamma)_{ijk} + \varepsilon_{ijkl}$$

$$i = 1,..,A,\ j = 1,...,B, k = 1,..,C, l = 1,..,n$$

$$n_T = A \times B \times C \times n,$$

$$\varepsilon_{ijkl} \overset{iid}{\sim} N(0, \sigma^2), \sum_{i=1}^{A} \alpha_i = 0, \sum_{j=1}^{B} \beta_j = 0, \sum_{k=1}^{C} \gamma_k = 0, \sum_{i=1}^{A} (\alpha\beta)_{ij} = 0, \sum_{i=1}^{A} (\alpha\gamma)_{ik} = 0,$$

$$\sum_{i=1}^{A} (\alpha\beta\gamma)_{ijk} = 0, \sum_{j=1}^{B} (\alpha\beta)_{ij} = 0, \sum_{j=1}^{B} (\beta\gamma)_{jk} = 0, \sum_{j=1}^{B} (\alpha\beta\gamma)_{ijk} = 0, \sum_{k=1}^{C} (\alpha\gamma)_{ik} = 0,$$

$$\sum_{k=1}^{C} (\beta\gamma)_{jk} = 0, \sum_{k=1}^{C} (\alpha\beta\gamma)_{ijk} = 0,$$

Note : The error distribution is normal distribution only.

6.2)The analysis:

$$X_{ijkl} = \hat{\mu} + \hat{\alpha}_i + \hat{\beta}_j + \hat{\gamma}_k + (\hat{\alpha}\hat{\beta})_{ij} + (\hat{\alpha}\hat{\gamma})_{ik} + (\hat{\beta}\hat{\gamma})_{jk} + (\hat{\alpha}\hat{\beta}\hat{\gamma})_{ijk} + e_{ijkl},$$

$$n_T = A \times B \times C \times n$$

$$SST = \sum_i \sum_j \sum_k \sum_l (X_{ijk})^2 - n_T \times (\overline{X}\ldots)^2, df = n_T - 1,,$$

$$SSA = \sum_i \sum_j \sum_k \sum_l (\hat{\alpha}_i)^2, df = A - 1, SSB = \sum_i \sum_j \sum_k \sum_l (\hat{\beta}_j)^2, df = B - 1,$$

$$SSC = \sum_i \sum_j \sum_k \sum_l (\hat{\gamma}_k)^2 df = C - 1, SSA \times B = \sum_i \sum_j \sum_k \sum_l ((\hat{\alpha}\hat{\beta})_{ij})^2 df = (A-1) \times (B-1),$$

$$SSA \times C = \sum_i \sum_j \sum_k \sum_l ((\hat{\alpha}\hat{\gamma})_{ik})^2 df = (A-1) \times (C-1),$$

$$SSB \times C = \sum_i \sum_j \sum_k \sum_l ((\beta\gamma)_{jk})^2 df = (B-1) \times (C-1),$$

$$SSA \times B \times C = \sum_i \sum_j \sum_k \sum_l ((\alpha\beta\gamma)_{ijk})^2 df = (A-1) \times (B-1) \times (C-1),$$

$$SSE = SST - SSA - SSB - SSC - SSA \times C - SSB \times C - SSA \times B \times C,$$

$$df = n_T - A \times B \times C$$

$$H_0 : \alpha_1 = ... = \alpha_A = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSA/(A-1)}{SSE/(n_T - A \times B \times C)},$$

$$H_0 : \beta_1 = ... = \beta_B = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSB/(B-1)}{SSE/(n_T - A \times B \times C)},$$

$$H_0 : \gamma_1 = ... = \gamma_C = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSC/(C-1)}{SSE/(n_T - A \times B \times C)}$$

$$H_0 : (\alpha\beta)_{11} = ... = (\alpha\beta)_{AB} = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSA \times B / ((A-1)(B-1))}{SSE / (n_T - A \times B \times C)},$$

$$H_0 : (\alpha\gamma)_{11} = ... = (\alpha\gamma)_{AC} = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSA \times C / ((A-1)(C-1))}{SSE / (n_T - A \times B \times C)},$$

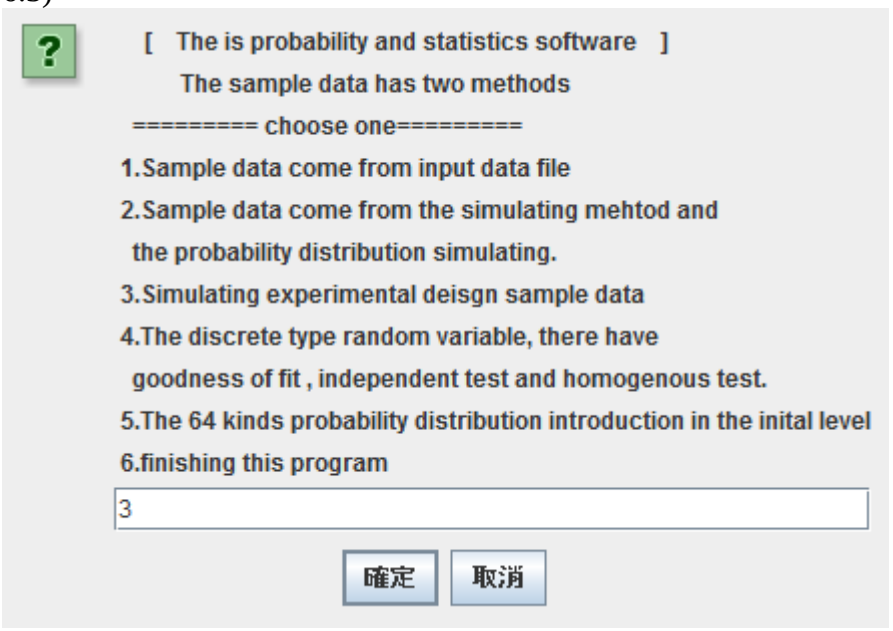
$$H_0 : (\beta\gamma)_{11} = ... = (\beta\gamma)_{BC} = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSB \times C / ((B-1)(C-1))}{SSE / (n_T - A \times B \times C)},$$

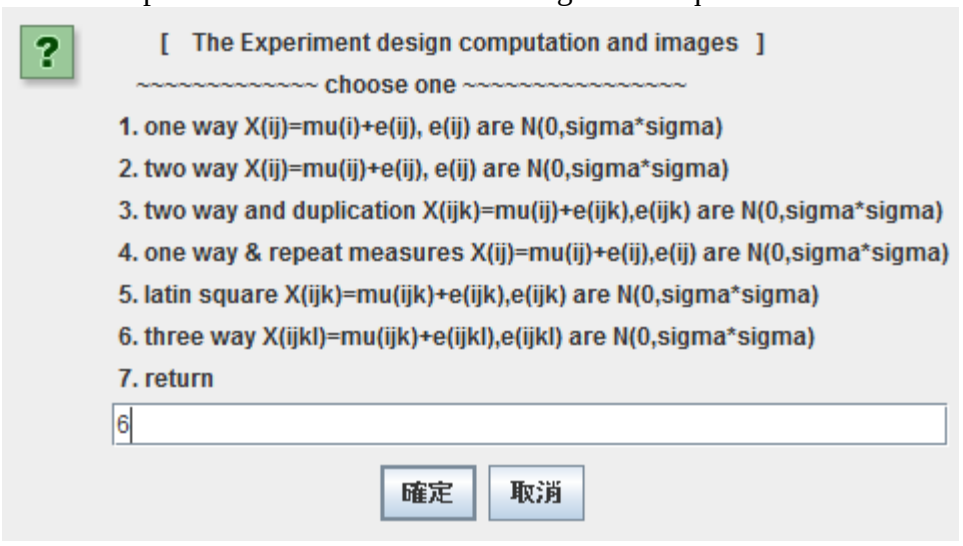
$$H_0 : (\alpha\beta\gamma)_{111} = ... = (\alpha\beta\gamma)_{ABC} = 0, H_1 : \text{against} \quad H_0$$

$$test \quad statistic = \frac{SSA \times B \times C / ((A-1)(B-1)(C-1))}{SSE / (n_T - A \times B \times C)},$$

6.3)



The sample data is simulated in according to the requirements.



6.3.1)The number of factor A is 4 and the number of factor B is 3.
(A=2,B=3,C=3,n=5).

$X_{ijkl} = \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\beta\gamma)_{jk} + (\alpha\beta\gamma)_{ijk} + \varepsilon_{ijkl}$

$i = 1,..,A,\ j = 1,...,B, k = 1,..,C, l = 1,..,n$

$\alpha_1 = \alpha_2 = ... = \alpha_A = 0,\ \beta_1 = \beta_2 = ... = \beta_B = 0,\ \gamma_1 = \gamma_2 = ... = \gamma_C = 0,$

$(\alpha\beta)_{11} = ...(\alpha\beta)_{AB} = 0, (\alpha\gamma)_{11} = ...(\alpha\gamma)_{AC} = 0,$

$(\beta\gamma)_{11} = ...(\beta\gamma)_{BC} = 0, (\alpha\beta\gamma)_{11} = ...(\alpha\beta\gamma)_{ABC} = 0,$

6.3.1.1)(A=2,B=3,C=3,n=5).

$X_{ijk} = \mu + \alpha_i + \beta_j + \gamma_k + \varepsilon_{ijk}, i = 1,..,n,\ j = 1,...,n, k = 1,..,n,$

$\alpha_1 = \alpha_2 = ... = \alpha_A = 0,\ \beta_1 = \beta_2 = ... = \beta_B = 0,\ \gamma_1 = \gamma_2 = ... = \gamma_C = 0,$

$(\alpha\beta)_{11} = ...(\alpha\beta)_{AB} = 0, (\alpha\gamma)_{11} = ...(\alpha\gamma)_{AC} = 0,$

$(\beta\gamma)_{11} = ...(\beta\gamma)_{BC} = 0, (\alpha\beta\gamma)_{11} = ...(\alpha\beta\gamma)_{ABC} = 0,$

$\mu = -10,\ \varepsilon_{ij}$ ~ Normal distribution, $E(\varepsilon_{ij}) = 0, Var(\varepsilon_{ij}) = 25,$

X(1,1,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,1,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,1,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,2,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,2,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,2,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,3,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,3,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(1,3,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,1,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,1,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,1,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,2,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,2,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,2,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,3,1)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,3,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,3,3)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5

X(ijkl)=mu+alpha(i)+beta(j)+alpha*beta(ij)+alpha*gamma(ik)+beta*gamma(jk)+alpha*beta*gamma(ijk)+e(ijkl)
,i=1,..,2, j=1,..,3,k=1,..,3,l=1,..,5
mu=-10.000000,
alpha(1)=0.000000, alpha(2)=0.000000,
beta(1)=0.000000, beta(2)=0.000000, beta(3)=0.000000,
gamma(1)=0.000000, gamma(2)=0.000000, gamma(3)=0.000000,
alpha*beta(1,1)=0.000000, alpha*beta(1,2)=0.000000, alpha*beta(1,3)=0.000000,
alpha*beta(2,1)=0.000000, alpha*beta(2,2)=0.000000, alpha*beta(2,3)=0.000000,

alpha*gamma(1,1)=0.000000, alpha*gamma(1,2)=0.000000,
alpha*gamma(1,3)=0.000000,
alpha*gamma(2,1)=0.000000, alpha*gamma(2,2)=0.000000,
alpha*gamma(2,3)=0.000000,

beta*gamma(1,1)=0.000000, beta*gamma(1,2)=0.000000,
beta*gamma(1,3)=0.000000,
beta*gamma(2,1)=0.000000, beta*gamma(2,2)=0.000000,
beta*gamma(2,3)=0.000000,
beta*gamma(3,1)=0.000000, beta*gamma(3,2)=0.000000,
beta*gamma(3,3)=0.000000,

alpha*beta*gamma(1,1,1)=0.000000, alpha*beta*gamma(1,1,2)=0.000000,
alpha*beta*gamma(1,1,3)=0.000000,
alpha*beta*gamma(1,2,1)=0.000000, alpha*beta*gamma(1,2,2)=0.000000,
alpha*beta*gamma(1,2,3)=0.000000,
alpha*beta*gamma(1,3,1)=0.000000, alpha*beta*gamma(1,3,2)=0.000000,
alpha*beta*gamma(1,3,3)=0.000000,
alpha*beta*gamma(2,1,1)=0.000000, alpha*beta*gamma(2,1,2)=0.000000,
alpha*beta*gamma(2,1,3)=0.000000,
alpha*beta*gamma(2,2,1)=0.000000, alpha*beta*gamma(2,2,2)=0.000000,
alpha*beta*gamma(2,2,3)=0.000000,
alpha*beta*gamma(2,3,1)=0.000000, alpha*beta*gamma(2,3,2)=0.000000,
alpha*beta*gamma(2,3,3)=0.000000,

eijl iid ~Normal(0,sigma*sigma=25.000000)

A1 B1 C1	-17.7726887678,	-10.9224187073,	-19.9141203399,	-14.8662731549, -13.0170587728,
A1 B1 C2	-21.7493712717,	-11.0333560961,	-10.2054196820,	-14.9594149272, -4.8801806227,
A1 B1 C3	-5.0980470381,	0.5248601185,	-9.9168224752,	-7.8460853163, -6.7320488456,
A1 B2 C1	-0.6967283262,	-8.1166432549,	-2.4078274729,	-6.3698780217, -16.5438772048,
A1 B2 C2	-5.0631184573,	-0.3382678232,	-8.0820516572,	-15.9834121074, -10.1789839691,
A1 B2 C3	-16.4823650104,	0.5320193631,	-3.0403356425,	-12.0536723950, -18.4036575997,
A1 B3 C1	-2.3382783184,	-14.9096760260,	-12.6895926607,	-15.0180210190, -4.6987238890,
A1 B3 C2	-14.8450594998,	-7.7941822277,	-10.1075143340,	-8.1376265310, -6.9240917911,
A1 B3 C3	-21.8631081553,	-14.8423384256,	-9.8996427638,	-10.8861706605, -3.6679821504,
A2 B1 C1	-16.2505315941,	-19.1504088376,	-11.8903427016,	-4.5715012537, -5.5774178061,
A2 B1 C2	-5.1655821669,	-12.9680382989,	-12.3571908438,	-6.5693833740, -15.5487200982,
A2 B1 C3	1.5981300474,	-14.5698983887,	-3.2208304098,	-11.2178049360, -20.8358135259,
A2 B2 C1	-3.8386635095,	-14.1508908087,	2.9489066752,	-14.3575287550, 2.7564772188,
A2 B2 C2	-12.5020155045,	-5.1191488171,	-3.8973555278,	-14.4829317924, -7.7095743356,
A2 B2 C3	-9.0379840589,	-8.1596915039,	-7.5630777515,	-15.3945892863, -13.9023705220,
A2 B3 C1	-13.2908090607,	-11.1153118518,	-0.6056379896,	-16.3720677673, -11.8947125014,
A2 B3 C2	-9.6380817836,	-8.9849513130,	-8.8445510364,	-5.6236054342, -18.1312949213,
A2 B3 C3	-11.8755793606,	-8.9905598409,	-10.8154169899,	-12.8472911488, -10.6904625115,

There are two factors :A, B and C

three way model

X(ijkl)=mu+alpha(i)+beta(j)+gamma(k)+alpha*beta(ij)+alpha*gamma(ik)+beta*gamma(jk)+alpha*beta*gamma(ijk)+e(ijkl)

i=1,2...,2, j=1,2...,3, k=1,2,...,3,l=1,2,...,5

	A1	A2	
factor A sample mean	-10.00532	-9.83169	
alpha estimate value	-0.08681	0.08681	
	B1	B2	B3
factor B sample mean	-10.88946	-8.25464	-10.61141
beta estimate value	-0.97096	1.66386	-0.69291
	C1	C2	C3
factor C sample mean	-9.92141	-9.92748	-9.90662
gamma estimate value	-0.00290	-0.00898	0.01188

Total sample size=90 , grand mean=-9.918504

factor A and factor B interaction parameter

the A1 B1 sample mean = -11.225896
the A1 B2 sample mean = -8.215253
the A1 B3 sample mean = -10.574801
the A2 B1 sample mean = -10.553022
the A2 B2 sample mean = -8.294029
the A2 B3 sample mean = -10.648022

the alpha*beta(1,1) = -0.249624
the alpha*beta(1,2) = 0.126201
the alpha*beta(1,3) = 0.123424
the alpha*beta(2,1) = 0.249624
the alpha*beta(2,2) = -0.126201
the alpha*beta(2,3) = -0.123424

factor A and factor C interaction parameter

the A1 C1 sample mean = -10.685454
the A1 C2 sample mean = -10.018803
the A1 C3 sample mean = -9.311693
the A2 C1 sample mean = -9.157363
the A2 C2 sample mean = -9.836162
the A2 C3 sample mean = -10.501549

the alpha*gamma(1,1) = -0.677233
the alpha*gamma(1,2) = -0.004508
the alpha*gamma(1,3) = 0.681741
the alpha*gamma(2,1) = 0.677233
the alpha*gamma(2,2) = 0.004508
the alpha*gamma(2,3) = -0.681741

factor B and factor C interaction parameter
the B1 C1 sample mean = -13.393276
the B1 C2 sample mean = -11.543666
the B1 C3 sample mean = -7.731436
the B2 C1 sample mean = -6.077665
the B2 C2 sample mean = -8.335686
the B2 C3 sample mean = -10.350572
the B3 C1 sample mean = -10.293283
the B3 C2 sample mean = -9.903096
the B3 C3 sample mean = -11.637855

the alpha*gamma(1,1) = -2.500913
the alpha*gamma(1,2) = -0.645228
the alpha*gamma(1,3) = 3.146140
the alpha*gamma(2,1) = 2.179880
the alpha*gamma(2,2) = -0.072066
the alpha*gamma(2,3) = -2.107814
the alpha*gamma(3,1) = 0.321033
the alpha*gamma(3,2) = 0.717294
the alpha*gamma(3,3) = -1.038327

factor A , factor B and factor C interaction parameter
the A1 B1 C1 sample mean = -15.298512
the A1 B1 C2 sample mean = -12.565549
the A1 B1 C3 sample mean = -5.813629
the A1 B2 C1 sample mean = -6.826991
the A1 B2 C2 sample mean = -7.929167
the A1 B2 C3 sample mean = -9.889602
the A1 B3 C1 sample mean = -9.930858
the A1 B3 C2 sample mean = -9.561695
the A1 B3 C3 sample mean = -12.231848
the A2 B1 C1 sample mean = -11.488040
the A2 B1 C2 sample mean = -10.521783
the A2 B1 C3 sample mean = -9.649243
the A2 B2 C1 sample mean = -5.328340
the A2 B2 C2 sample mean = -8.742205
the A2 B2 C3 sample mean = -10.811543
the A2 B3 C1 sample mean = -10.655708
the A2 B3 C2 sample mean = -10.244497
the A2 B3 C3 sample mean = -11.043862

the alpha*beta*gamma(A1,B1,C1) = -0.891566
the alpha*beta*gamma(A1,B1,C2) = -0.680938
the alpha*beta*gamma(A1,B1,C3) = 1.572504
the alpha*beta*gamma(A1,B2,C1) = -0.111481
the alpha*beta*gamma(A1,B2,C2) = 0.371639
the alpha*beta*gamma(A1,B2,C3) = -0.260159
the alpha*beta*gamma(A1,B3,C1) = 1.003047
the alpha*beta*gamma(A1,B3,C2) = 0.309298
the alpha*beta*gamma(A1,B3,C3) = -1.312345
the alpha*beta*gamma(A2,B1,C1) = 0.891566
the alpha*beta*gamma(A2,B1,C2) = 0.680938
the alpha*beta*gamma(A2,B1,C3) = -1.572504
the alpha*beta*gamma(A2,B2,C1) = 0.111481
the alpha*beta*gamma(A2,B2,C2) = -0.371639
the alpha*beta*gamma(A2,B2,C3) = 0.260159
the alpha*beta*gamma(A2,B3,C1) = -1.003047
the alpha*beta*gamma(A2,B3,C2) = -0.309298
the alpha*beta*gamma(A2,B3,C3) = 1.312345

summation of alpha(i)=0.000000

summation of beta(j)=0.000000

summation of gamma(k)=0.000000

A1 summation of alpha*beta=-0.000000
A2 summation of alpha*beta=-0.000000
B1 summation of alpha*beta=-0.000000
B2 summation of alpha*beta=-0.000000
B3 summation of alpha*beta=-0.000000
A1 summation of alpha*gamma=-0.000000
A2 summation of alpha*gamma=-0.000000
C1 summation of beta*gamma=-0.000000
C2 summation of beta*gamma=0.000000
C3 summation of beta*gamma=-0.000000
B1 summation of beta*gamma=0.000000
B2 summation of beta*gamma=0.000000
B3 summation of beta*gamma=-0.000000
C1 summation of alpha*gamma=-0.000000
C2 summation of alpha*gamma=0.000000
C3 summation of alpha*gamma=0.000000
A1 B1 summation of alpha*beta*gamma=0.000000
A1 B2 summation of alpha*beta*gamma=0.000000
A1 B3 summation of alpha*beta*gamma=0.000000
A2 B1 summation of alpha*beta*gamma=0.000000
A2 B2 summation of alpha*beta*gamma=0.000000
A2 B3 summation of alpha*beta*gamma=0.000000
A1 C1 summation of alpha*beta*gamma=0.000000
A1 C2 summation of alpha*beta*gamma=0.000000

A1 C3 summation of alpha*beta*gamma=0.000000
A2 C1 summation of alpha*beta*gamma=0.000000
A2 C2 summation of alpha*beta*gamma=0.000000
A2 C3 summation of alpha*beta*gamma=0.000000
B1 C1 summation of alpha*beta*gamma=0.000000
B1 C2 summation of alpha*beta*gamma=0.000000
B1 C3 summation of alpha*beta*gamma=0.000000
B2 C1 summation of alpha*beta*gamma=0.000000
B2 C2 summation of alpha*beta*gamma=0.000000
B2 C3 summation of alpha*beta*gamma=0.000000
B3 C1 summation of alpha*beta*gamma=0.000000
B3 C2 summation of alpha*beta*gamma=0.000000
B3 C3 summation of alpha*beta*gamma=0.000000

ANOVA

Source	df	SS	MS	F
Factor A	1	0.6782808992	0.6782808992	0.0200704104
Factor B	2	125.7394241795	62.8697120898	1.8603220689
Factor C	2	0.0069074603	0.0034537301	0.0001021963
A,B interaction	2	2.8041688329	1.4020844165	0.0414878404
A,C interaction	2	27.7030540103	13.8515270052	0.4098682898
B,C interaction	4	274.6472827740	68.6618206935	2.0317112339
A,B,C interaction	4	67.7357679619	16.9339419905	0.5010773066
Error	72	2433.2449451724	33.7950686830	
Total	89	2932.5598312906		

H0:alpha(1)=...=alpha(2)=0
F(1,72) test value=0.020070
The F test p value=0.887700

H0:beta(1)=...=beta(3)=0
F(2,72) test value=1.860322
The F test p value=0.163100

H0:gamma1)=...=gamma(3)=0
F(2,72) test value=0.000102
The F test p value=0.999900

H0:alpha*beta(1,1)=...=alpha*beta(2,3)=0
F(2,72) test value=0.041488
The F test p value=0.959500

H0:alpha*gamma(1,1)=...=alpha*gamma(2,3)=0
F(2,72) test value=0.409868
The F test p value=0.665400

H0:beta*gamma(1,1)=...=beta*gamma(3,3)=0
F(4,72) test value=2.031711
The F test p value=0.099000

H0:alpha*beta*gamma(1,1,1)=...=alpha*beta*gamma(2,3,3)=0
F(4,72) test value=0.501077
The F test p value=0.735000

class	[1]	[2]	[3]	[4]	[5]	[6]	[7]
lower limit		-6.20756	-3.29013	-1.04721	1.04603	3.28844	6.20470
upper limit	-6.20756	-3.29013	-1.04721	1.04603	3.28844	6.20470	
observed no	11.00000	12.00000	15.00000	13.00000	16.00000	10.00000	13.00000
probability	0.14286	0.14286	0.14286	0.14286	0.14286	0.14286	0.14286
expected no	12.85714	12.85714	12.85714	12.85714	12.85714	12.85714	12.85714
chi square	0.26825	0.05714	0.35714	0.00159	0.76825	0.63492	0.00159

degree of freedom=5

H0: residual~Normal(0,sigma(error)*sigma(error)), sigma(error) are unknown
pearson chi-square test statistic =2.088889
p-value=0.836700

H0: Variances are equal
The Bartlett chi-square test statistic =44.229489
p-value=0.995900

~~~~~ The run test of residual~~~~~~~~~~~~~~
number of the negative of residual=44
number of the positive ofresidual=46
Run=51
H0: residualis random , H1: Increasing line or decreasing line
Z=1.065308, p-value=0.856700
H0: residual is random , H1: Oscillation
Z=1.065308, p-value=0.143300
H0: residual is random , H1: Increasing line or decreasing line or Oscillation
Z=1.065308, p-value=0.286600
~~~~~

multiple comparison of population means

Factor A ,there has 2 cateogries
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1)-mu(2)
[-2.6169738690, 2.26972284890]
mu(1)=mu(2)

Factor B ,there has 3 cateogries
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1)-mu(2)
[-5.6272964459, 0.35766029730]
mu(1)=mu(2)

95% C.I. for mu(1)-mu(3)
[-3.2705263091, 2.71443043410]
mu(1)=mu(3)

95% C.I. for mu(2)-mu(3)
[-0.6357082348, 5.34924850840]
mu(2)=mu(3)

Factor C ,there has 3 cateogries
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1)-mu(2)
[-2.9864040461, 2.99855269710]
mu(1)=mu(2)

95% C.I. for mu(1)-mu(3)
[-3.0072653481, 2.97769139510]
mu(1)=mu(3)

95% C.I. for mu(2)-mu(3)
[-3.0133396736, 2.97161706960]
mu(2)=mu(3)

The interaction of factor A and factor B ,there are 6 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1)-mu(1,2)
[-7.2426465862, 1.22136041020]

mu(1,1)=mu(1,2)

95% C.I. for mu(1,1)-mu(1,3)
[-4.8830993280, 3.58090766840]
mu(1,1)=mu(1,3)

95% C.I. for mu(1,1)-mu(2,1)
[-4.9048776123, 3.55912938420]
mu(1,1)=mu(2,1)

95% C.I. for mu(1,1)-mu(2,2)
[-7.1638706729, 1.30013632360]
mu(1,1)=mu(2,2)

95% C.I. for mu(1,1)-mu(2,3)
[-4.8098776574, 3.65412933900]
mu(1,1)=mu(2,3)

95% C.I. for mu(1,2)-mu(1,3)
[-1.8724562400, 6.59155075640]
mu(1,2)=mu(1,3)

95% C.I. for mu(1,2)-mu(2,1)
[-1.8942345243, 6.56977247210]
mu(1,2)=mu(2,1)

95% C.I. for mu(1,2)-mu(2,2)
[-4.1532275849, 4.31077941160]
mu(1,2)=mu(2,2)

95% C.I. for mu(1,2)-mu(2,3)
[-1.7992345694, 6.66477242700]
mu(1,2)=mu(2,3)

95% C.I. for mu(1,3)-mu(2,1)
[-4.2537817825, 4.21022521390]
mu(1,3)=mu(2,1)

95% C.I. for mu(1,3)-mu(2,2)
[-6.5127748431, 1.95123215340]

mu(1,3)=mu(2,2)

95% C.I. for mu(1,3)-mu(2,3)
[-4.1587818277, 4.30522516880]
mu(1,3)=mu(2,3)

95% C.I. for mu(2,1)-mu(2,2)
[-6.4909965588, 1.97301043760]
mu(2,1)=mu(2,2)

95% C.I. for mu(2,1)-mu(2,3)
[-4.1370035434, 4.32700345310]
mu(2,1)=mu(2,3)

95% C.I. for mu(2,2)-mu(2,3)
[-1.8780104828, 6.58599651370]
mu(2,2)=mu(2,3)

The interaction of factor A and factor C ,there are 6 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1)-mu(1,2)
[-4.8986538275, 3.56535316900]
mu(1,1)=mu(1,2)

95% C.I. for mu(1,1)-mu(1,3)
[-5.6057640942, 2.85824290230]
mu(1,1)=mu(1,3)

95% C.I. for mu(1,1)-mu(2,1)
[-5.7600945244, 2.70391247200]
mu(1,1)=mu(2,1)

95% C.I. for mu(1,1)-mu(2,2)
[-5.0812955441, 3.38271145230]
mu(1,1)=mu(2,2)

95% C.I. for mu(1,1)-mu(2,3)
[-4.4159078815, 4.04809911500]
mu(1,1)=mu(2,3)

95% C.I. for mu(1,2)-mu(1,3)
[-4.9391137649, 3.52489323150]
mu(1,2)=mu(1,3)

95% C.I. for mu(1,2)-mu(2,1)
[-5.0934441952, 3.37056280130]
mu(1,2)=mu(2,1)

95% C.I. for mu(1,2)-mu(2,2)
[-4.4146452149, 4.04936178160]
mu(1,2)=mu(2,2)

95% C.I. for mu(1,2)-mu(2,3)
[-3.7492575522, 4.71474944420]
mu(1,2)=mu(2,3)

95% C.I. for mu(1,3)-mu(2,1)
[-4.3863339285, 4.07767306800]
mu(1,3)=mu(2,1)

95% C.I. for mu(1,3)-mu(2,2)
[-3.7075349482, 4.75647204830]
mu(1,3)=mu(2,2)

95% C.I. for mu(1,3)-mu(2,3)
[-3.0421472855, 5.42185971090]
mu(1,3)=mu(2,3)

95% C.I. for mu(2,1)-mu(2,2)
[-3.5532045179, 4.91080247850]
mu(2,1)=mu(2,2)

95% C.I. for mu(2,1)-mu(2,3)
[-2.8878168553, 5.57619014120]
mu(2,1)=mu(2,3)

95% C.I. for mu(2,2)-mu(2,3)
[-3.5666158356, 4.89739116090]
mu(2,2)=mu(2,3)

The interaction of factor B and factor C ,there are 9 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1)-mu(1,2)
[-7.0327350356, 3.33351412470]
mu(1,1)=mu(1,2)

95% C.I. for mu(1,1)-mu(1,3)
[-10.8449646968, -0.47871553640]
mu(1,1)<mu(1,3)
95% C.I. for mu(1,1)-mu(2,1)
[-12.4987354278, -2.13248626750]
mu(1,1)<mu(2,1)
95% C.I. for mu(1,1)-mu(2,2)
[-10.2407147746, 0.12553438570]
mu(1,1)=mu(2,2)

95% C.I. for mu(1,1)-mu(2,3)
[-8.2258283330, 2.14042082730]
mu(1,1)=mu(2,3)

95% C.I. for mu(1,1)-mu(3,1)
[-8.2831176653, 2.08313149500]
mu(1,1)=mu(3,1)

95% C.I. for mu(1,1)-mu(3,2)
[-8.6733048865, 1.69294427380]
mu(1,1)=mu(3,2)

95% C.I. for mu(1,1)-mu(3,3)
[-6.9385455730, 3.42770358730]
mu(1,1)=mu(3,3)

95% C.I. for mu(1,2)-mu(1,3)
[-8.9953542413, 1.37089491900]
mu(1,2)=mu(1,3)

95% C.I. for mu(1,2)-mu(2,1)
[-10.6491249724, -0.28287581200]
mu(1,2)<mu(2,1)
95% C.I. for mu(1,2)-mu(2,2)
[-8.3911043192, 1.97514484120]

mu(1,2)=mu(2,2)

95% C.I. for mu(1,2)-mu(2,3)
[-6.3762178776, 3.99003128270]
mu(1,2)=mu(2,3)

95% C.I. for mu(1,2)-mu(3,1)
[-6.4335072099, 3.93274195040]
mu(1,2)=mu(3,1)

95% C.I. for mu(1,2)-mu(3,2)
[-6.8236944311, 3.54255472920]
mu(1,2)=mu(3,2)

95% C.I. for mu(1,2)-mu(3,3)
[-5.0889351176, 5.27731404270]
mu(1,2)=mu(3,3)

95% C.I. for mu(1,3)-mu(2,1)
[-6.8368953112, 3.52935384910]
mu(1,3)=mu(2,1)

95% C.I. for mu(1,3)-mu(2,2)
[-4.5788746580, 5.78737450230]
mu(1,3)=mu(2,2)

95% C.I. for mu(1,3)-mu(2,3)
[-2.5639882164, 7.80226094390]
mu(1,3)=mu(2,3)

95% C.I. for mu(1,3)-mu(3,1)
[-2.6212775487, 7.74497161160]
mu(1,3)=mu(3,1)

95% C.I. for mu(1,3)-mu(3,2)
[-3.0114647699, 7.35478439040]
mu(1,3)=mu(3,2)

95% C.I. for mu(1,3)-mu(3,3)
[-1.2767054564, 9.08954370390]

mu(1,3)=mu(3,3)

95% C.I. for mu(2,1)-mu(2,2)
[-2.9251039270, 7.44114523340]
mu(2,1)=mu(2,2)

95% C.I. for mu(2,1)-mu(2,3)
[-0.9102174854, 9.45603167490]
mu(2,1)=mu(2,3)

95% C.I. for mu(2,1)-mu(3,1)
[-0.9675068177, 9.39874234260]
mu(2,1)=mu(3,1)

95% C.I. for mu(2,1)-mu(3,2)
[-1.3576940389, 9.00855512140]
mu(2,1)=mu(3,2)

95% C.I. for mu(2,1)-mu(3,3)
[0.3770652746, 10.74331443490]
mu(2,1)>mu(3,3)

95% C.I. for mu(2,2)-mu(2,3)
[-3.1682381386, 7.19801102170]
mu(2,2)=mu(2,3)

95% C.I. for mu(2,2)-mu(3,1)
[-3.2255274709, 7.14072168940]
mu(2,2)=mu(3,1)

95% C.I. for mu(2,2)-mu(3,2)
[-3.6157146921, 6.75053446820]
mu(2,2)=mu(3,2)

95% C.I. for mu(2,2)-mu(3,3)
[-1.8809553786, 8.48529378170]
mu(2,2)=mu(3,3)

95% C.I. for mu(2,3)-mu(3,1)
[-5.2404139125, 5.12583524780]
mu(2,3)=mu(3,1)

95% C.I. for mu(2,3)-mu(3,2)
[-5.6306011337, 4.73564802660]
mu(2,3)=mu(3,2)

95% C.I. for mu(2,3)-mu(3,3)
[-3.8958418202, 6.47040734020]
mu(2,3)=mu(3,3)

95% C.I. for mu(3,1)-mu(3,2)
[-5.5733118013, 4.79293735900]
mu(3,1)=mu(3,2)

95% C.I. for mu(3,1)-mu(3,3)
[-3.8385524878, 6.52769667250]
mu(3,1)=mu(3,3)

95% C.I. for mu(3,2)-mu(3,3)
[-3.4483652666, 6.91788389370]
mu(3,2)=mu(3,3)

The interaction of factor A ,factor B and factor C,there are 18 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1,1)-mu(1,1,2)
[-9.1796555321, 5.48043462130]
mu(1,1,1)=mu(1,1,2)

95% C.I. for mu(1,1,1)-mu(1,1,3)
[-12.9918851933, 1.66820496010]
mu(1,1,1)=mu(1,1,3)

95% C.I. for mu(1,1,1)-mu(1,2,1)
[-14.6456559243, 0.01443422910]
mu(1,1,1)=mu(1,2,1)

95% C.I. for mu(1,1,1)-mu(1,2,2)
[-12.3876352711, 2.27245488230]
mu(1,1,1)=mu(1,2,2)

95% C.I. for mu(1,1,1)-mu(1,2,3)

[-10.3727488296, 4.28734132390]
mu(1,1,1)=mu(1,2,3)

95% C.I. for mu(1,1,1)-mu(2,3,1)
[-10.4300381619, 4.23005199150]
mu(1,1,1)=mu(2,3,1)

95% C.I. for mu(1,1,1)-mu(2,3,2)
[-10.8202253831, 3.83986477040]
mu(1,1,1)=mu(2,3,2)

95% C.I. for mu(1,1,1)-mu(2,3,3)
[-9.0854660696, 5.57462408390]
mu(1,1,1)=mu(2,3,3)

95% C.I. for mu(1,1,1)-mu(2,1,1)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(2,1,1)
95% C.I. for mu(1,1,1)-mu(2,1,2)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(2,1,2)
95% C.I. for mu(1,1,1)-mu(2,1,3)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(2,1,3)
95% C.I. for mu(1,1,1)-mu(3,2,1)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,2,1)
95% C.I. for mu(1,1,1)-mu(3,2,2)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,2,2)
95% C.I. for mu(1,1,1)-mu(3,2,3)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,2,3)
95% C.I. for mu(1,1,1)-mu(3,3,1)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,3,1)
95% C.I. for mu(1,1,1)-mu(3,3,2)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,3,2)
95% C.I. for mu(1,1,1)-mu(3,3,3)
[-20.7233212703, -6.06323111680]
mu(1,1,1)<mu(3,3,3)
95% C.I. for mu(1,1,2)-mu(1,1,3)
[-11.1422747379, 3.51781541560]
mu(1,1,2)=mu(1,1,3)

95% C.I. for mu(1,1,2)-mu(1,2,1)
[-12.7960454689, 1.86404468450]
mu(1,1,2)=mu(1,2,1)

95% C.I. for mu(1,1,2)-mu(1,2,2)
[-10.5380248157, 4.12206533770]
mu(1,1,2)=mu(1,2,2)

95% C.I. for mu(1,1,2)-mu(1,2,3)
[-8.5231383742, 6.13695177930]
mu(1,1,2)=mu(1,2,3)

95% C.I. for mu(1,1,2)-mu(2,3,1)
[-8.5804277065, 6.07966244700]
mu(1,1,2)=mu(2,3,1)

95% C.I. for mu(1,1,2)-mu(2,3,2)
[-8.9706149277, 5.68947522580]
mu(1,1,2)=mu(2,3,2)

95% C.I. for mu(1,1,2)-mu(2,3,3)
[-7.2358556142, 7.42423453930]
mu(1,1,2)=mu(2,3,3)

95% C.I. for mu(1,1,2)-mu(2,1,1)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(2,1,1)
95% C.I. for mu(1,1,2)-mu(2,1,2)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(2,1,2)
95% C.I. for mu(1,1,2)-mu(2,1,3)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(2,1,3)
95% C.I. for mu(1,1,2)-mu(3,2,1)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,2,1)
95% C.I. for mu(1,1,2)-mu(3,2,2)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,2,2)
95% C.I. for mu(1,1,2)-mu(3,2,3)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,2,3)
95% C.I. for mu(1,1,2)-mu(3,3,1)

[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,3,1)
95% C.I. for mu(1,1,2)-mu(3,3,2)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,3,2)
95% C.I. for mu(1,1,2)-mu(3,3,3)
[-18.8737108149, -4.21362066140]
mu(1,1,2)<mu(3,3,3)
95% C.I. for mu(1,1,3)-mu(1,2,1)
[-8.9838158077, 5.67627434570]
mu(1,1,3)=mu(1,2,1)

95% C.I. for mu(1,1,3)-mu(1,2,2)
[-6.7257951545, 7.93429499890]
mu(1,1,3)=mu(1,2,2)

95% C.I. for mu(1,1,3)-mu(1,2,3)
[-4.7109087130, 9.94918144050]
mu(1,1,3)=mu(1,2,3)

95% C.I. for mu(1,1,3)-mu(2,3,1)
[-4.7681980453, 9.89189210810]
mu(1,1,3)=mu(2,3,1)

95% C.I. for mu(1,1,3)-mu(2,3,2)
[-5.1583852665, 9.50170488700]
mu(1,1,3)=mu(2,3,2)

95% C.I. for mu(1,1,3)-mu(2,3,3)
[-3.4236259530, 11.23646420050]
mu(1,1,3)=mu(2,3,3)

95% C.I. for mu(1,1,3)-mu(2,1,1)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(2,1,1)
95% C.I. for mu(1,1,3)-mu(2,1,2)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(2,1,2)
95% C.I. for mu(1,1,3)-mu(2,1,3)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(2,1,3)
95% C.I. for mu(1,1,3)-mu(3,2,1)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,2,1)

95% C.I. for mu(1,1,3)-mu(3,2,2)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,2,2)
95% C.I. for mu(1,1,3)-mu(3,2,3)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,2,3)
95% C.I. for mu(1,1,3)-mu(3,3,1)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,3,1)
95% C.I. for mu(1,1,3)-mu(3,3,2)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,3,2)
95% C.I. for mu(1,1,3)-mu(3,3,3)
[-15.0614811537, -0.40139100020]
mu(1,1,3)<mu(3,3,3)
95% C.I. for mu(1,2,1)-mu(1,2,2)
[-5.0720244235, 9.58806572990]
mu(1,2,1)=mu(1,2,2)

95% C.I. for mu(1,2,1)-mu(1,2,3)
[-3.0571379820, 11.60295217150]
mu(1,2,1)=mu(1,2,3)

95% C.I. for mu(1,2,1)-mu(2,3,1)
[-3.1144273143, 11.54566283920]
mu(1,2,1)=mu(2,3,1)

95% C.I. for mu(1,2,1)-mu(2,3,2)
[-3.5046145355, 11.15547561800]
mu(1,2,1)=mu(2,3,2)

95% C.I. for mu(1,2,1)-mu(2,3,3)
[-1.7698552220, 12.89023493150]
mu(1,2,1)=mu(2,3,3)

95% C.I. for mu(1,2,1)-mu(2,1,1)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(2,1,1)

95% C.I. for mu(1,2,1)-mu(2,1,2)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(2,1,2)

95% C.I. for mu(1,2,1)-mu(2,1,3)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(2,1,3)

95% C.I. for mu(1,2,1)-mu(3,2,1)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,2,1)

95% C.I. for mu(1,2,1)-mu(3,2,2)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,2,2)

95% C.I. for mu(1,2,1)-mu(3,2,3)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,2,3)

95% C.I. for mu(1,2,1)-mu(3,3,1)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,3,1)

95% C.I. for mu(1,2,1)-mu(3,3,2)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,3,2)

95% C.I. for mu(1,2,1)-mu(3,3,3)
[-13.4077104227, 1.25237973080]
mu(1,2,1)=mu(3,3,3)

95% C.I. for mu(1,2,2)-mu(1,2,3)
[-5.3151586352, 9.34493151830]
mu(1,2,2)=mu(1,2,3)

95% C.I. for mu(1,2,2)-mu(2,3,1)
[-5.3724479675, 9.28764218600]
mu(1,2,2)=mu(2,3,1)

95% C.I. for mu(1,2,2)-mu(2,3,2)
[-5.7626351887, 8.89745496480]
mu(1,2,2)=mu(2,3,2)

95% C.I. for mu(1,2,2)-mu(2,3,3)
[-4.0278758752, 10.63221427830]
mu(1,2,2)=mu(2,3,3)

95% C.I. for mu(1,2,2)-mu(2,1,1)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(2,1,1)
95% C.I. for mu(1,2,2)-mu(2,1,2)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(2,1,2)
95% C.I. for mu(1,2,2)-mu(2,1,3)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(2,1,3)
95% C.I. for mu(1,2,2)-mu(3,2,1)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,2,1)
95% C.I. for mu(1,2,2)-mu(3,2,2)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,2,2)
95% C.I. for mu(1,2,2)-mu(3,2,3)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,2,3)
95% C.I. for mu(1,2,2)-mu(3,3,1)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,3,1)
95% C.I. for mu(1,2,2)-mu(3,3,2)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,3,2)
95% C.I. for mu(1,2,2)-mu(3,3,3)
[-15.6657310759, -1.00564092240]
mu(1,2,2)<mu(3,3,3)
95% C.I. for mu(1,2,3)-mu(2,3,1)
[-7.3873344091, 7.27275574440]
mu(1,2,3)=mu(2,3,1)

95% C.I. for mu(1,2,3)-mu(2,3,2)
[-7.7775216302, 6.88256852320]
mu(1,2,3)=mu(2,3,2)

95% C.I. for mu(1,2,3)-mu(2,3,3)
[-6.0427623167, 8.61732783670]
mu(1,2,3)=mu(2,3,3)

95% C.I. for mu(1,2,3)-mu(2,1,1)
[-17.6806175174, -3.02052736400]
mu(1,2,3)<mu(2,1,1)

```
     95% C.I. for mu(1,2,3)-mu(2,1,2)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(2,1,2)
     95% C.I. for mu(1,2,3)-mu(2,1,3)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(2,1,3)
     95% C.I. for mu(1,2,3)-mu(3,2,1)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,2,1)
     95% C.I. for mu(1,2,3)-mu(3,2,2)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,2,2)
     95% C.I. for mu(1,2,3)-mu(3,2,3)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,2,3)
     95% C.I. for mu(1,2,3)-mu(3,3,1)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,3,1)
     95% C.I. for mu(1,2,3)-mu(3,3,2)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,3,2)
     95% C.I. for mu(1,2,3)-mu(3,3,3)
[          -17.6806175174,           -3.02052736400]
   mu(1,2,3)<mu(3,3,3)
     95% C.I. for mu(1,3,1)-mu(2,3,2)
[           -7.7202322979,            6.93985785550]
   mu(1,3,1)=mu(2,3,2)


     95% C.I. for mu(1,3,1)-mu(2,3,3)
[           -5.9854729844,            8.67461716910]
   mu(1,3,1)=mu(2,3,3)


     95% C.I. for mu(1,3,1)-mu(2,1,1)
[          -17.6233281851,           -2.96323803170]
   mu(1,3,1)<mu(2,1,1)
     95% C.I. for mu(1,3,1)-mu(2,1,2)
[          -17.6233281851,           -2.96323803170]
   mu(1,3,1)<mu(2,1,2)
     95% C.I. for mu(1,3,1)-mu(2,1,3)
[          -17.6233281851,           -2.96323803170]
   mu(1,3,1)<mu(2,1,3)
     95% C.I. for mu(1,3,1)-mu(3,2,1)
[          -17.6233281851,           -2.96323803170]
   mu(1,3,1)<mu(3,2,1)
     95% C.I. for mu(1,3,1)-mu(3,2,2)
[          -17.6233281851,           -2.96323803170]
   mu(1,3,1)<mu(3,2,2)
     95% C.I. for mu(1,3,1)-mu(3,2,3)
```

[-17.6233281851, -2.96323803170]
mu(1,3,1)<mu(3,2,3)
95% C.I. for mu(1,3,1)-mu(3,3,1)
[-17.6233281851, -2.96323803170]
mu(1,3,1)<mu(3,3,1)
95% C.I. for mu(1,3,1)-mu(3,3,2)
[-17.6233281851, -2.96323803170]
mu(1,3,1)<mu(3,3,2)
95% C.I. for mu(1,3,1)-mu(3,3,3)
[-17.6233281851, -2.96323803170]
mu(1,3,1)<mu(3,3,3)
95% C.I. for mu(1,3,2)-mu(2,3,3)
[-5.5952857632, 9.06480439020]
mu(1,3,2)=mu(2,3,3)

95% C.I. for mu(1,3,2)-mu(2,1,1)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(2,1,1)
95% C.I. for mu(1,3,2)-mu(2,1,2)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(2,1,2)
95% C.I. for mu(1,3,2)-mu(2,1,3)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(2,1,3)
95% C.I. for mu(1,3,2)-mu(3,2,1)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,2,1)
95% C.I. for mu(1,3,2)-mu(3,2,2)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,2,2)
95% C.I. for mu(1,3,2)-mu(3,2,3)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,2,3)
95% C.I. for mu(1,3,2)-mu(3,3,1)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,3,1)
95% C.I. for mu(1,3,2)-mu(3,3,2)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,3,2)
95% C.I. for mu(1,3,2)-mu(3,3,3)
[-17.2331409639, -2.57305081050]
mu(1,3,2)<mu(3,3,3)
95% C.I. for mu(1,3,3)-mu(2,1,1)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(2,1,1)
95% C.I. for mu(1,3,3)-mu(2,1,2)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(2,1,2)
95% C.I. for mu(1,3,3)-mu(2,1,3)

[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(2,1,3)
95% C.I. for mu(1,3,3)-mu(3,2,1)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,2,1)
95% C.I. for mu(1,3,3)-mu(3,2,2)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,2,2)
95% C.I. for mu(1,3,3)-mu(3,2,3)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,2,3)
95% C.I. for mu(1,3,3)-mu(3,3,1)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,3,1)
95% C.I. for mu(1,3,3)-mu(3,3,2)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,3,2)
95% C.I. for mu(1,3,3)-mu(3,3,3)
[-18.9679002774, -4.30781012400]
mu(1,3,3)<mu(3,3,3)
95% C.I. for mu(2,1,1)-mu(2,1,2)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(2,1,2)

95% C.I. for mu(2,1,1)-mu(2,1,3)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(2,1,3)

95% C.I. for mu(2,1,1)-mu(3,2,1)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,2,1)

95% C.I. for mu(2,1,1)-mu(3,2,2)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,2,2)

95% C.I. for mu(2,1,1)-mu(3,2,3)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,2,3)

95% C.I. for mu(2,1,1)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,3,1)

95% C.I. for mu(2,1,1)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,3,2)

95% C.I. for mu(2,1,1)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,1,1)=mu(3,3,3)

95% C.I. for mu(2,1,2)-mu(2,1,3)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(2,1,3)

95% C.I. for mu(2,1,2)-mu(3,2,1)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,2,1)

95% C.I. for mu(2,1,2)-mu(3,2,2)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,2,2)

95% C.I. for mu(2,1,2)-mu(3,2,3)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,2,3)

95% C.I. for mu(2,1,2)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,3,1)

95% C.I. for mu(2,1,2)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,3,2)

95% C.I. for mu(2,1,2)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,1,2)=mu(3,3,3)

95% C.I. for mu(2,1,3)-mu(3,2,1)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,2,1)

95% C.I. for mu(2,1,3)-mu(3,2,2)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,2,2)

95% C.I. for mu(2,1,3)-mu(3,2,3)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,2,3)

95% C.I. for mu(2,1,3)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,3,1)

95% C.I. for mu(2,1,3)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,3,2)

95% C.I. for mu(2,1,3)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,1,3)=mu(3,3,3)

95% C.I. for mu(2,2,1)-mu(3,2,2)
[-7.3300450767, 7.33004507670]
mu(2,2,1)=mu(3,2,2)

95% C.I. for mu(2,2,1)-mu(3,2,3)
[-7.3300450767, 7.33004507670]
mu(2,2,1)=mu(3,2,3)

95% C.I. for mu(2,2,1)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,2,1)=mu(3,3,1)

95% C.I. for mu(2,2,1)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,2,1)=mu(3,3,2)

95% C.I. for mu(2,2,1)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,2,1)=mu(3,3,3)

95% C.I. for mu(2,2,2)-mu(3,2,3)
[-7.3300450767, 7.33004507670]
mu(2,2,2)=mu(3,2,3)

95% C.I. for mu(2,2,2)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,2,2)=mu(3,3,1)

95% C.I. for mu(2,2,2)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,2,2)=mu(3,3,2)

95% C.I. for mu(2,2,2)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,2,2)=mu(3,3,3)

95% C.I. for mu(2,2,3)-mu(3,3,1)
[-7.3300450767, 7.33004507670]
mu(2,2,3)=mu(3,3,1)

95% C.I. for mu(2,2,3)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,2,3)=mu(3,3,2)

95% C.I. for mu(2,2,3)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,2,3)=mu(3,3,3)

95% C.I. for mu(2,3,1)-mu(3,3,2)
[-7.3300450767, 7.33004507670]
mu(2,3,1)=mu(3,3,2)

95% C.I. for mu(2,3,1)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,3,1)=mu(3,3,3)

95% C.I. for mu(2,3,2)-mu(3,3,3)
[-7.3300450767, 7.33004507670]
mu(2,3,2)=mu(3,3,3)

~~~~~~~~~~~~ error ~~~~~~~~~~~~

A1 B1 C1|	-2.47418,	4.37609,	-4.61561,	0.43224,	2.28145,
A1 B1 C2|	-9.18382,	1.53219,	2.36013,	-2.39387,	7.68537,
A1 B1 C3|	0.71558,	6.33849,	-4.10319,	-2.03246,	-0.91842,
A1 B2 C1|	6.13026,	-1.28965,	4.41916,	0.45711,	-9.71689,
A1 B2 C2|	2.86605,	7.59090,	-0.15288,	-8.05425,	-2.24982,
A1 B2 C3|	-6.59276,	10.42162,	6.84927,	-2.16407,	-8.51406,
A1 B3 C1|	7.59258,	-4.97882,	-2.75873,	-5.08716,	5.23213,
A1 B3 C2|	-5.28336,	1.76751,	-0.54582,	1.42407,	2.63760,
A1 B3 C3|	-9.63126,	-2.61049,	2.33221,	1.34568,	8.56387,
A2 B1 C1|	-4.76249,	-7.66237,	-0.40230,	6.91654,	5.91062,
A2 B1 C2|	5.35620,	-2.44626,	-1.83541,	3.95240,	-5.02694,
A2 B1 C3|	11.24737,	-4.92065,	6.42841,	-1.56856,	-11.18657,
A2 B2 C1|	1.48968,	-8.82255,	8.27725,	-9.02919,	8.08482,
A2 B2 C2|	-3.75981,	3.62306,	4.84485,	-5.74073,	1.03263,
A2 B2 C3|	1.77356,	2.65185,	3.24846,	-4.58305,	-3.09083,
A2 B3 C1|	-2.63510,	-0.45960,	10.05007,	-5.71636,	-1.23900,
A2 B3 C2|	0.60642,	1.25955,	1.39995,	4.62089,	-7.88680,
A2 B3 C3|	-0.83172,	2.05330,	0.22844,	-1.80343,	0.35340,

The common population standard deviation and variance confidence interval
90% confidence interval for population variance
[26.217658 , 45.513769]
90% confidence interval for population standard deviation
[5.120318 , 6.746389]
95% confidence interval for population variance
[24.993218 , 48.252259]
95% confidence interval for population standard deviation
[4.999322 , 6.946385]
99% confidence interval for population variance
[22.813346 , 54.262503]
99% confidence interval for population standard deviation
[4.776332 , 7.366309]
~~~~~~~~~~~~

6.3.1.2) (A=2,B=3,C=3,n=5).

$X_{ijk} = \mu + \alpha_i + \beta_j + \gamma_k + \varepsilon_{ijk}, i = 1,..,n,\ j = 1,...,n, k = 1,..,n,$

$\alpha_1 = 1, \alpha_2 = 5,\ \beta_1 = 0, \beta_2 = 5, \beta_3 = 10,\ \gamma_1 = -5, \gamma_2 = 0, \gamma_C = 5,$

$(\alpha\beta)_{11} = 5, (\alpha\beta)_{12} = -5, (\alpha\beta)_{13} = 0,$

$(\alpha\beta)_{21} = -5, (\alpha\beta)_{22} = 5, (\alpha\beta)_{23} = 0,$

$(\alpha\gamma)_{11} = 5, (\alpha\gamma)_{12} = 0, (\alpha\gamma)_{13} = -5,$

$(\alpha\gamma)_{21} = -5, (\alpha\gamma)_{22} = 0, (\alpha\gamma)_{23} = 5,$

$(\beta\gamma)_{11} = ...(\beta\gamma)_{BC} = 0, (\alpha\beta\gamma)_{11} = ...(\alpha\beta\gamma)_{ABC} = 0,$

$\mu = -10,\ \varepsilon_{ij}$ ~ Normal distribution, $E(\varepsilon_{ij}) = 0, Var(\varepsilon_{ij}) = 25,$

X(1,1,1)~Normal(mu=1.000000,sigma*sigma=25.000000), sample size=5
X(1,1,2)~Normal(mu=-4.000000,sigma*sigma=25.000000), sample size=5
X(1,1,3)~Normal(mu=-9.000000,sigma*sigma=25.000000), sample size=5
X(1,2,1)~Normal(mu=-4.000000,sigma*sigma=25.000000), sample size=5
X(1,2,2)~Normal(mu=-9.000000,sigma*sigma=25.000000), sample size=5
X(1,2,3)~Normal(mu=-14.000000,sigma*sigma=25.000000), sample size=5
X(1,3,1)~Normal(mu=6.000000,sigma*sigma=25.000000), sample size=5
X(1,3,2)~Normal(mu=1.000000,sigma*sigma=25.000000), sample size=5
X(1,3,3)~Normal(mu=-4.000000,sigma*sigma=25.000000), sample size=5
X(2,1,1)~Normal(mu=-15.000000,sigma*sigma=25.000000), sample size=5
X(2,1,2)~Normal(mu=-10.000000,sigma*sigma=25.000000), sample size=5
X(2,1,3)~Normal(mu=-5.000000,sigma*sigma=25.000000), sample size=5
X(2,2,1)~Normal(mu=0.000000,sigma*sigma=25.000000), sample size=5
X(2,2,2)~Normal(mu=5.000000,sigma*sigma=25.000000), sample size=5
X(2,2,3)~Normal(mu=10.000000,sigma*sigma=25.000000), sample size=5
X(2,3,1)~Normal(mu=0.000000,sigma*sigma=25.000000), sample size=5
X(2,3,2)~Normal(mu=5.000000,sigma*sigma=25.000000), sample size=5
X(2,3,3)~Normal(mu=10.000000,sigma*sigma=25.000000), sample size=5

X(ijkl)=mu+alpha(i)+beta(j)+alpha*beta(ij)+alpha*gamma(ik)+beta*gamma(jk)+alpha*beta*gamma(ijk)+e(ijkl)
,i=1,..,2, j=1,..,3,k=1,..,3,l=1,..,5
mu=-10.000000,
alpha(1)=1.000000, alpha(2)=5.000000,
beta(1)=0.000000, beta(2)=5.000000, beta(3)=10.000000,
gamma(1)=-5.000000, gamma(2)=0.000000, gamma(3)=5.000000,
alpha*beta(1,1)=5.000000, alpha*beta(1,2)=-5.000000, alpha*beta(1,3)=0.000000,
alpha*beta(2,1)=-5.000000, alpha*beta(2,2)=5.000000, alpha*beta(2,3)=0.000000,

alpha*gamma(1,1)=5.000000, alpha*gamma(1,2)=0.000000,
alpha*gamma(1,3)=-5.000000,
alpha*gamma(2,1)=-5.000000, alpha*gamma(2,2)=0.000000,
alpha*gamma(2,3)=5.000000,

beta*gamma(1,1)=0.000000, beta*gamma(1,2)=0.000000,
beta*gamma(1,3)=0.000000,
beta*gamma(2,1)=0.000000, beta*gamma(2,2)=0.000000,
beta*gamma(2,3)=0.000000,
beta*gamma(3,1)=0.000000, beta*gamma(3,2)=0.000000,
beta*gamma(3,3)=0.000000,

alpha*beta*gamma(1,1,1)=0.000000, alpha*beta*gamma(1,1,2)=0.000000,
alpha*beta*gamma(1,1,3)=0.000000,
alpha*beta*gamma(1,2,1)=0.000000, alpha*beta*gamma(1,2,2)=0.000000,
alpha*beta*gamma(1,2,3)=0.000000,
alpha*beta*gamma(1,3,1)=0.000000, alpha*beta*gamma(1,3,2)=0.000000,
alpha*beta*gamma(1,3,3)=0.000000,
alpha*beta*gamma(2,1,1)=0.000000, alpha*beta*gamma(2,1,2)=0.000000,
alpha*beta*gamma(2,1,3)=0.000000,
alpha*beta*gamma(2,2,1)=0.000000, alpha*beta*gamma(2,2,2)=0.000000,
alpha*beta*gamma(2,2,3)=0.000000,
alpha*beta*gamma(2,3,1)=0.000000, alpha*beta*gamma(2,3,2)=0.000000,
alpha*beta*gamma(2,3,3)=0.000000,

eijl iid ~Normal(0,sigma*sigma=25.000000)

A1 B1 C1 | -0.8010099303, -2.7446702774, -6.7625348125, -1.1866322178,
-1.7536389567,
A1 B1 C2 | 1.8334815738, -9.6538244527, -7.4056915815, 4.6072538888,
-14.1482720787,
A1 B1 C3 | -6.2192716792, -5.7166118477, -9.4656450662, -10.8742711183,
-7.5602322497,
A1 B2 C1 | -5.0086025684, -6.3233887199, -6.2963502094, -9.0615888251,
1.2723613305,
A1 B2 C2 | -10.1349259100, -14.0862154042, -11.7735754223, -10.0516125159,
-2.1002137985,
A1 B2 C3 | -9.5118109430, -12.7649267252, -12.2950346386, -15.0273865152,
-13.7015417161,
A1 B3 C1 | 9.6527988387, 5.7042880281, 12.6476237227, 14.2022140714,
3.4252805070,
A1 B3 C2 | -2.0659566910, -5.9197615222, 7.5406663528, -0.9384966903,
10.6817471690,
A1 B3 C3 | -4.5090262105, -4.6844476451, -14.3407823469, -13.5541426943,
4.2293631489,
A2 B1 C1 | -18.7093446085, -10.0220856736, -12.4653252479, -21.7270111293,
-23.9215957846,
A2 B1 C2 | -14.8547443037, -15.1835566440, -13.4887562022, -10.2625057851,
-11.6092246315,
A2 B1 C3 | -14.3348998011, -6.5077993499, -5.8446563989, -2.5326834463,
0.9428165354,
A2 B2 C1 | -5.5890602283, 5.8111940827, 0.1546844083, 1.6252740261,
-8.9029644440,
A2 B2 C2 | 4.6422360636, -2.1200022332, 5.6475953323, 7.7747102728,
2.4747555172,
A2 B2 C3 | 8.0235054963, 5.6049018816, 14.9627609140, 13.2746776620,
19.1329979328,
A2 B3 C1 | -7.7675544278, -15.6279058433, 0.9205824017, 2.2931101058,
1.2497507384,
A2 B3 C2 | 7.5639852752, 4.6761497847, -1.0332311986, 5.2025499051,
3.3314357065,
A2 B3 C3 | 11.5470174007, 11.2278640967, 6.4464551240, 17.0497239151,
8.0426025670,

There are two factors :A, B and C

three way model

X(ijkl)=mu+alpha(i)+beta(j)+gamma(k)+alpha*beta(ij)+alpha*gamma(ik)+beta*gamma(jk)+alpha*beta*gamma(ijk)+e(ijkl)

i=1,2...,2, j=1,2...,3, k=1,2,...,3,l=1,2,...,5

	A1	A2	
factor A sample mean	-4.28100	-1.17515	
alpha estimate value	-1.55293	1.55293	
	B1	B2	B3
factor B sample mean	-8.61243	-2.14492	2.57313
beta estimate value	-5.88436	0.58315	5.30120
	C1	C2	C3
factor C sample mean	-3.52374	-3.02847	-1.63202
gamma estimate value	-0.79566	-0.30039	1.09606

Total sample size=90 , grand mean=-2.728073

factor A and factor B interaction parameter

the A1 B1 sample mean = -5.190105
the A1 B2 sample mean = -9.124321
the A1 B3 sample mean = 1.471425
the A2 B1 sample mean = -12.034758
the A2 B2 sample mean = 4.834484
the A2 B3 sample mean = 3.674836

the alpha*beta(1,1) = 4.975254
the alpha*beta(1,2) = -5.426475
the alpha*beta(1,3) = 0.451222
the alpha*beta(2,1) = -4.975254
the alpha*beta(2,2) = 5.426475
the alpha*beta(2,3) = -0.451222

factor A and factor C interaction parameter

the A1 C1 sample mean = 0.464410
the A1 C2 sample mean = -4.241026
the A1 C3 sample mean = -9.066385
the A2 C1 sample mean = -7.511883
the A2 C2 sample mean = -1.815907
the A2 C3 sample mean = 5.802352

the alpha*gamma(1,1) = 5.541074
the alpha*gamma(1,2) = 0.340367
the alpha*gamma(1,3) = -5.881441
the alpha*gamma(2,1) = -5.541074
the alpha*gamma(2,2) = -0.340367
the alpha*gamma(2,3) = 5.881441

factor B and factor C interaction parameter
the B1 C1 sample mean = -10.009385
the B1 C2 sample mean = -9.016584
the B1 C3 sample mean = -6.811325
the B2 C1 sample mean = -3.231844
the B2 C2 sample mean = -2.972725
the B2 C3 sample mean = -0.230186
the B3 C1 sample mean = 2.670019
the B3 C2 sample mean = 2.903909
the B3 C3 sample mean = 2.145463

the alpha*gamma(1,1) = -0.601290
the alpha*gamma(1,2) = -0.103759
the alpha*gamma(1,3) = 0.705049
the alpha*gamma(2,1) = -0.291262
the alpha*gamma(2,2) = -0.527413
the alpha*gamma(2,3) = 0.818675
the alpha*gamma(3,1) = 0.892552
the alpha*gamma(3,2) = 0.631172
the alpha*gamma(3,3) = -1.523724

factor A , factor B and factor C interaction parameter
the A1 B1 C1 sample mean = -2.649697
the A1 B1 C2 sample mean = -4.953411
the A1 B1 C3 sample mean = -7.967206
the A1 B2 C1 sample mean = -5.083514
the A1 B2 C2 sample mean = -9.629309
the A1 B2 C3 sample mean = -12.660140
the A1 B3 C1 sample mean = 9.126441
the A1 B3 C2 sample mean = 1.859640
the A1 B3 C3 sample mean = -6.571807
the A2 B1 C1 sample mean = -17.369072
the A2 B1 C2 sample mean = -13.079758
the A2 B1 C3 sample mean = -5.655444
the A2 B2 C1 sample mean = -1.380174
the A2 B2 C2 sample mean = 3.683859
the A2 B2 C3 sample mean = 12.199769
the A2 B3 C1 sample mean = -3.786403
the A2 B3 C2 sample mean = 3.948178
the A2 B3 C3 sample mean = 10.862733

the alpha*beta*gamma(A1,B1,C1) = -1.603713
the alpha*beta*gamma(A1,B1,C2) = 0.300479
the alpha*beta*gamma(A1,B1,C3) = 1.303234
the alpha*beta*gamma(A1,B2,C1) = -0.413341
the alpha*beta*gamma(A1,B2,C2) = -0.017549
the alpha*beta*gamma(A1,B2,C3) = 0.430889

the alpha*beta*gamma(A1,B3,C1) = 2.017054
the alpha*beta*gamma(A1,B3,C2) = -0.282931
the alpha*beta*gamma(A1,B3,C3) = -1.734123
the alpha*beta*gamma(A2,B1,C1) = 1.603713
the alpha*beta*gamma(A2,B1,C2) = -0.300479
the alpha*beta*gamma(A2,B1,C3) = -1.303234
the alpha*beta*gamma(A2,B2,C1) = 0.413341
the alpha*beta*gamma(A2,B2,C2) = 0.017549
the alpha*beta*gamma(A2,B2,C3) = -0.430889
the alpha*beta*gamma(A2,B3,C1) = -2.017054
the alpha*beta*gamma(A2,B3,C2) = 0.282931
the alpha*beta*gamma(A2,B3,C3) = 1.734123

summation of alpha(i)=-0.000000

summation of beta(j)=-0.000000

summation of gamma(k)=-0.000000

A1 summation of alpha*beta=0.000000
A2 summation of alpha*beta=0.000000
B1 summation of alpha*beta=-0.000000
B2 summation of alpha*beta=0.000000
B3 summation of alpha*beta=0.000000
A1 summation of alpha*gamma=0.000000
A2 summation of alpha*gamma=0.000000
C1 summation of beta*gamma=0.000000
C2 summation of beta*gamma=0.000000
C3 summation of beta*gamma=0.000000
B1 summation of beta*gamma=-0.000000
B2 summation of beta*gamma=0.000000
B3 summation of beta*gamma=0.000000
C1 summation of alpha*gamma=0.000000
C2 summation of alpha*gamma=0.000000
C3 summation of alpha*gamma=0.000000
A1 B1 summation of alpha*beta*gamma=0.000000
A1 B2 summation of alpha*beta*gamma=-0.000000
A1 B3 summation of alpha*beta*gamma=-0.000000
A2 B1 summation of alpha*beta*gamma=0.000000
A2 B2 summation of alpha*beta*gamma=-0.000000
A2 B3 summation of alpha*beta*gamma=0.000000
A1 C1 summation of alpha*beta*gamma=-0.000000
A1 C2 summation of alpha*beta*gamma=0.000000
A1 C3 summation of alpha*beta*gamma=-0.000000
A2 C1 summation of alpha*beta*gamma=-0.000000
A2 C2 summation of alpha*beta*gamma=-0.000000
A2 C3 summation of alpha*beta*gamma=0.000000
B1 C1 summation of alpha*beta*gamma=-0.000000
B1 C2 summation of alpha*beta*gamma=0.000000

B1 C3 summation of alpha*beta*gamma=0.000000
B2 C1 summation of alpha*beta*gamma=-0.000000
B2 C2 summation of alpha*beta*gamma=-0.000000
B2 C3 summation of alpha*beta*gamma=-0.000000
B3 C1 summation of alpha*beta*gamma=-0.000000
B3 C2 summation of alpha*beta*gamma=-0.000000
B3 C3 summation of alpha*beta*gamma=0.000000

ANOVA

Source	df	SS	MS	F
Factor A	1	217.0424509995	217.0424509995	8.1896066060
Factor B	2	1892.0549496383	946.0274748191	35.6962097577
Factor C	2	57.7397337800	28.8698668900	1.0893392122
A,B interaction	2	1632.1016478485	816.0508239243	30.7918344436
A,C interaction	2	1962.3210315176	981.1605157588	37.0218756947
B,C interaction	4	54.1940137448	13.5485034362	0.5112221721
A,B,C interaction	4	118.7316449143	29.6829112286	1.1200176038
Error	72	1908.1571586823	26.5021827595	
Total	89	7842.3426311253		

H0:alpha(1)=...=alpha(2)=0
F(1,72) test value=8.189607
The F test p value=0.005600

H0:beta(1)=...=beta(3)=0
F(2,72) test value=35.696210
The F test p value=0.000100

H0:gamma1)=...=gamma(3)=0
F(2,72) test value=1.089339
The F test p value=0.341900

H0:alpha*beta(1,1)=...=alpha*beta(2,3)=0
F(2,72) test value=30.791834
The F test p value=0.000100

H0:alpha*gamma(1,1)=...=alpha*gamma(2,3)=0
F(2,72) test value=37.021876
The F test p value=0.000100

H0:beta*gamma(1,1)=...=beta*gamma(3,3)=0
F(4,72) test value=0.511222
The F test p value=0.727700

H0:alpha*beta*gamma(1,1,1)=...=alpha*beta*gamma(2,3,3)=0
F(4,72) test value=1.120018
The F test p value=0.353900

class	[1]	[2]	[3]	[4]	[5]	[6]	[7]
lower limit		-5.49712	-2.91359	-0.92736	0.92631	2.91209	5.49459
upper limit	-5.49712	-2.91359	-0.92736	0.92631	2.91209	5.49459	
observed no	11.00000	12.00000	14.00000	16.00000	14.00000	10.00000	13.00000
probability	0.14286	0.14286	0.14286	0.14286	0.14286	0.14286	0.14286
expected no	12.85714	12.85714	12.85714	12.85714	12.85714	12.85714	12.85714
chi square	0.26825	0.05714	0.10159	0.76825	0.10159	0.63492	0.00159

degree of freedom=5

H0: residual~Normal(0,sigma(error)*sigma(error)), sigma(error) are unknown
pearson chi-square test statistic =1.933333
p-value=0.858300

H0: Variances are equal
The Bartlett chi-square test statistic =54.952621
p-value=0.932400

~~~~~ The run test of residual~~~~~~~~~~~~~~~
number of the negative of residual=45
number of the positive ofresidual=45
Run=46
H0: residualis random , H1: Increasing line or decreasing line
Z=0.000000, p-value=0.500000
H0: residual is random , H1: Oscillation
Z=0.000000, p-value=0.500000
H0: residual is random , H1: Increasing line or decreasing line or Oscillation
Z=0.000000, p-value=1.000000

multiple comparison of population means

Factor A ,there has 2 cateogries
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1)-mu(2)
[-5.2695667969, -0.94214187480]
mu(1)<mu(2)
Factor B ,there has 3 cateogries
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1)-mu(2)
[-9.1175089858, -3.81751750620]
~~~~~

```
   mu(1)<mu(2)
     95% C.I. for mu(1)-mu(3)
[          -13.8355573021,            -8.53556582240]
   mu(1)<mu(3)
     95% C.I. for mu(2)-mu(3)
[           -7.3680440560,            -2.06805257640]
   mu(2)<mu(3)
  Factor C ,there has 3 cateogries
  . LSD( least significant difference)
     The confidence coefficietn=0.95
     95% C.I. for mu(1)-mu(2)
[           -3.1452657871,             2.15472569250]
   mu(1)=mu(2)


     95% C.I. for mu(1)-mu(3)
[           -4.5417163373,             0.75827514230]
   mu(1)=mu(3)


     95% C.I. for mu(2)-mu(3)
[           -4.0464462900,             1.25354518960]
   mu(2)=mu(3)


  The interaction of factor A and factor B ,there are 6 cells
  . LSD( least significant difference)
     The confidence coefficietn=0.95
     95% C.I. for mu(1,1)-mu(1,2)
[            0.1865562029,             7.68187603380]
   mu(1,1)>mu(1,2)
     95% C.I. for mu(1,1)-mu(1,3)
[          -10.4091891718,            -2.91386934080]
   mu(1,1)<mu(1,3)
     95% C.I. for mu(1,1)-mu(2,1)
[            3.0969935288,            10.59231335980]
   mu(1,1)>mu(2,1)
     95% C.I. for mu(1,1)-mu(2,2)
[          -13.7722490815,            -6.27692925050]
   mu(1,1)<mu(2,2)
     95% C.I. for mu(1,1)-mu(2,3)
[          -12.6126003393,            -5.11728050830]
   mu(1,1)<mu(2,3)
     95% C.I. for mu(1,2)-mu(1,3)
[          -14.3434052901,            -6.84808545920]
   mu(1,2)<mu(1,3)
     95% C.I. for mu(1,2)-mu(2,1)
[           -0.8372225895,             6.65809724150]
   mu(1,2)=mu(2,1)
```

95% C.I. for mu(1,2)-mu(2,2)
[-17.7064651999, -10.21114536890]
mu(1,2)<mu(2,2)
95% C.I. for mu(1,2)-mu(2,3)
[-16.5468164577, -9.05149662670]
mu(1,2)<mu(2,3)
95% C.I. for mu(1,3)-mu(2,1)
[9.7585227851, 17.25384261610]
mu(1,3)>mu(2,1)
95% C.I. for mu(1,3)-mu(2,2)
[-7.1107198252, 0.38460000580]
mu(1,3)=mu(2,2)

95% C.I. for mu(1,3)-mu(2,3)
[-5.9510710830, 1.54424874800]
mu(1,3)=mu(2,3)

95% C.I. for mu(2,1)-mu(2,2)
[-20.6169025258, -13.12158269490]
mu(2,1)<mu(2,2)
95% C.I. for mu(2,1)-mu(2,3)
[-19.4572537837, -11.96193395270]
mu(2,1)<mu(2,3)
95% C.I. for mu(2,2)-mu(2,3)
[-2.5880111733, 4.90730865770]
mu(2,2)=mu(2,3)

The interaction of factor A and factor C ,there are 6 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1)-mu(1,2)
[0.9577765554, 8.45309638640]
mu(1,1)>mu(1,2)
95% C.I. for mu(1,1)-mu(1,3)
[5.7831346330, 13.27845446400]
mu(1,1)>mu(1,3)
95% C.I. for mu(1,1)-mu(2,1)
[4.2286335249, 11.72395335580]
mu(1,1)>mu(2,1)
95% C.I. for mu(1,1)-mu(2,2)
[-1.4673430407, 6.02797679030]
mu(1,1)=mu(2,2)

95% C.I. for mu(1,1)-mu(2,3)
[-9.0856022187, -1.59028238770]

mu(1,1)<mu(2,3)
95% C.I. for mu(1,2)-mu(1,3)
[1.0776981621, 8.57301799310]
mu(1,2)>mu(1,3)
95% C.I. for mu(1,2)-mu(2,1)
[-0.4768029461, 7.01851688490]
mu(1,2)=mu(2,1)

95% C.I. for mu(1,2)-mu(2,2)
[-6.1727795116, 1.32254031930]
mu(1,2)=mu(2,2)

95% C.I. for mu(1,2)-mu(2,3)
[-13.7910386896, -6.29571885870]
mu(1,2)<mu(2,3)
95% C.I. for mu(1,3)-mu(2,1)
[-5.3021610237, 2.19315880730]
mu(1,3)=mu(2,1)

95% C.I. for mu(1,3)-mu(2,2)
[-10.9981375892, -3.50281775830]
mu(1,3)<mu(2,2)
95% C.I. for mu(1,3)-mu(2,3)
[-18.6163967672, -11.12107693630]
mu(1,3)<mu(2,3)
95% C.I. for mu(2,1)-mu(2,2)
[-9.4436364810, -1.94831665010]
mu(2,1)<mu(2,2)
95% C.I. for mu(2,1)-mu(2,3)
[-17.0618956591, -9.56657582810]
mu(2,1)<mu(2,3)
95% C.I. for mu(2,2)-mu(2,3)
[-11.3659190935, -3.87059926250]
mu(2,2)<mu(2,3)
The interaction of factor B and factor C ,there are 9 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1)-mu(1,2)
[-5.5827281034, 3.59712641910]
mu(1,1)=mu(1,2)

95% C.I. for mu(1,1)-mu(1,3)
[-7.7879866829, 1.39186783950]
mu(1,1)=mu(1,3)

```
     95% C.I. for mu(1,1)-mu(2,1)
[          -11.3674680103,          -2.18761348790]
   mu(1,1)<mu(2,1)
     95% C.I. for mu(1,1)-mu(2,2)
[          -11.6265873152,          -2.44673279280]
   mu(1,1)<mu(2,2)
     95% C.I. for mu(1,1)-mu(2,3)
[          -14.3691264599,          -5.18927193750]
   mu(1,1)<mu(2,3)
     95% C.I. for mu(1,1)-mu(3,1)
[          -17.2693309393,          -8.08947641690]
   mu(1,1)<mu(3,1)
     95% C.I. for mu(1,1)-mu(3,2)
[          -17.5032209342,          -8.32336641180]
   mu(1,1)<mu(3,2)
     95% C.I. for mu(1,1)-mu(3,3)
[          -16.7447748606,          -7.56492033820]
   mu(1,1)<mu(3,3)
     95% C.I. for mu(1,2)-mu(1,3)
[           -6.7951858407,           2.38466868170]
   mu(1,2)=mu(1,3)


     95% C.I. for mu(1,2)-mu(2,1)
[          -10.3746671682,          -1.19481264570]
   mu(1,2)<mu(2,1)
     95% C.I. for mu(1,2)-mu(2,2)
[          -10.6337864731,          -1.45393195070]
   mu(1,2)<mu(2,2)
     95% C.I. for mu(1,2)-mu(2,3)
[          -13.3763256178,          -4.19647109530]
   mu(1,2)<mu(2,3)
     95% C.I. for mu(1,2)-mu(3,1)
[          -16.2765300972,          -7.09667557480]
   mu(1,2)<mu(3,1)
     95% C.I. for mu(1,2)-mu(3,2)
[          -16.5104200920,          -7.33056556960]
   mu(1,2)<mu(3,2)
     95% C.I. for mu(1,2)-mu(3,3)
[          -15.7519740185,          -6.57211949600]
   mu(1,2)<mu(3,3)
     95% C.I. for mu(1,3)-mu(2,1)
[           -8.1694085886,           1.01044593380]
   mu(1,3)=mu(2,1)


     95% C.I. for mu(1,3)-mu(2,2)
[           -8.4285278936,           0.75132662890]
   mu(1,3)=mu(2,2)
```

95% C.I. for mu(1,3)-mu(2,3)
[-11.1710670383, -1.99121251580]
mu(1,3)<mu(2,3)
95% C.I. for mu(1,3)-mu(3,1)
[-14.0712715177, -4.89141699520]
mu(1,3)<mu(3,1)
95% C.I. for mu(1,3)-mu(3,2)
[-14.3051615125, -5.12530699010]
mu(1,3)<mu(3,2)
95% C.I. for mu(1,3)-mu(3,3)
[-13.5467154390, -4.36686091650]
mu(1,3)<mu(3,3)
95% C.I. for mu(2,1)-mu(2,2)
[-4.8490465661, 4.33080795630]
mu(2,1)=mu(2,2)

95% C.I. for mu(2,1)-mu(2,3)
[-7.5915857108, 1.58826881160]
mu(2,1)=mu(2,3)

95% C.I. for mu(2,1)-mu(3,1)
[-10.4917901902, -1.31193566780]
mu(2,1)<mu(3,1)
95% C.I. for mu(2,1)-mu(3,2)
[-10.7256801851, -1.54582566270]
mu(2,1)<mu(3,2)
95% C.I. for mu(2,1)-mu(3,3)
[-9.9672341115, -0.78737958910]
mu(2,1)<mu(3,3)
95% C.I. for mu(2,2)-mu(2,3)
[-7.3324664059, 1.84738811650]
mu(2,2)=mu(2,3)

95% C.I. for mu(2,2)-mu(3,1)
[-10.2326708853, -1.05281636290]
mu(2,2)<mu(3,1)
95% C.I. for mu(2,2)-mu(3,2)
[-10.4665608802, -1.28670635770]
mu(2,2)<mu(3,2)
95% C.I. for mu(2,2)-mu(3,3)
[-9.7081148066, -0.52826028420]
mu(2,2)<mu(3,3)
95% C.I. for mu(2,3)-mu(3,1)
[-7.4901317406, 1.68972278180]
mu(2,3)=mu(3,1)

95% C.I. for mu(2,3)-mu(3,2)
[-7.7240217355, 1.45583278700]
mu(2,3)=mu(3,2)

95% C.I. for mu(2,3)-mu(3,3)
[-6.9655756619, 2.21427886050]
mu(2,3)=mu(3,3)

95% C.I. for mu(3,1)-mu(3,2)
[-4.8238172561, 4.35603726640]
mu(3,1)=mu(3,2)

95% C.I. for mu(3,1)-mu(3,3)
[-4.0653711825, 5.11448333990]
mu(3,1)=mu(3,3)

95% C.I. for mu(3,2)-mu(3,3)
[-3.8314811877, 5.34837333480]
mu(3,2)=mu(3,3)

The interaction of factor A ,factor B and factor C,there are 18 cells
. LSD(least significant difference)
The confidence coefficietn=0.95
95% C.I. for mu(1,1,1)-mu(1,1,2)
[-7.4839382253, 5.49833654100]
mu(1,1,1)=mu(1,1,2)

95% C.I. for mu(1,1,1)-mu(1,1,3)
[-9.6891968048, 3.29307796140]
mu(1,1,1)=mu(1,1,3)

95% C.I. for mu(1,1,1)-mu(1,2,1)
[-13.2686781322, -0.28640336600]
mu(1,1,1)<mu(1,2,1)
95% C.I. for mu(1,1,1)-mu(1,2,2)
[-13.5277974371, -0.54552267090]
mu(1,1,1)<mu(1,2,2)
95% C.I. for mu(1,1,1)-mu(1,2,3)
[-16.2703365818, -3.28806181560]
mu(1,1,1)<mu(1,2,3)
95% C.I. for mu(1,1,1)-mu(2,3,1)
[-19.1705410613, -6.18826629500]

mu(1,1,1)<mu(2,3,1)
95% C.I. for mu(1,1,1)-mu(2,3,2)
[-19.4044310561, -6.42215628990]
mu(1,1,1)<mu(2,3,2)
95% C.I. for mu(1,1,1)-mu(2,3,3)
[-18.6459849825, -5.66371021630]
mu(1,1,1)<mu(2,3,3)
95% C.I. for mu(1,1,1)-mu(2,1,1)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(2,1,1)
95% C.I. for mu(1,1,1)-mu(2,1,2)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(2,1,2)
95% C.I. for mu(1,1,1)-mu(2,1,3)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(2,1,3)
95% C.I. for mu(1,1,1)-mu(3,2,1)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,2,1)
95% C.I. for mu(1,1,1)-mu(3,2,2)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,2,2)
95% C.I. for mu(1,1,1)-mu(3,2,3)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,2,3)
95% C.I. for mu(1,1,1)-mu(3,3,1)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,3,1)
95% C.I. for mu(1,1,1)-mu(3,3,2)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,3,2)
95% C.I. for mu(1,1,1)-mu(3,3,3)
[-16.5005222470, -3.51824748070]
mu(1,1,1)<mu(3,3,3)
95% C.I. for mu(1,1,2)-mu(1,1,3)
[-8.6963959626, 4.28587880360]
mu(1,1,2)=mu(1,1,3)

95% C.I. for mu(1,1,2)-mu(1,2,1)
[-12.2758772901, 0.70639747620]
mu(1,1,2)=mu(1,2,1)

95% C.I. for mu(1,1,2)-mu(1,2,2)
[-12.5349965950, 0.44727817120]
mu(1,1,2)=mu(1,2,2)

95% C.I. for mu(1,1,2)-mu(1,2,3)

```
[          -15.2775357397,          -2.29526097340]
   mu(1,1,2)<mu(1,2,3)
    95% C.I. for mu(1,1,2)-mu(2,3,1)
[          -18.1777402191,          -5.19546545290]
   mu(1,1,2)<mu(2,3,1)
    95% C.I. for mu(1,1,2)-mu(2,3,2)
[          -18.4116302139,          -5.42935544770]
   mu(1,1,2)<mu(2,3,2)
    95% C.I. for mu(1,1,2)-mu(2,3,3)
[          -17.6531841404,          -4.67090937410]
   mu(1,1,2)<mu(2,3,3)
    95% C.I. for mu(1,1,2)-mu(2,1,1)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(2,1,1)
    95% C.I. for mu(1,1,2)-mu(2,1,2)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(2,1,2)
    95% C.I. for mu(1,1,2)-mu(2,1,3)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(2,1,3)
    95% C.I. for mu(1,1,2)-mu(3,2,1)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,2,1)
    95% C.I. for mu(1,1,2)-mu(3,2,2)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,2,2)
    95% C.I. for mu(1,1,2)-mu(3,2,3)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,2,3)
    95% C.I. for mu(1,1,2)-mu(3,3,1)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,3,1)
    95% C.I. for mu(1,1,2)-mu(3,3,2)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,3,2)
    95% C.I. for mu(1,1,2)-mu(3,3,3)
[          -15.5077214048,          -2.52544663860]
   mu(1,1,2)<mu(3,3,3)
    95% C.I. for mu(1,1,3)-mu(1,2,1)
[          -10.0706187105,           2.91165605570]
   mu(1,1,3)=mu(1,2,1)


    95% C.I. for mu(1,1,3)-mu(1,2,2)
[          -10.3297380155,           2.65253675080]
   mu(1,1,3)=mu(1,2,2)


    95% C.I. for mu(1,1,3)-mu(1,2,3)
[          -13.0722771602,          -0.09000239390]
```

```
   mu(1,1,3)<mu(1,2,3)
     95% C.I. for mu(1,1,3)-mu(2,3,1)
[          -15.9724816396,           -2.99020687330]
   mu(1,1,3)<mu(2,3,1)
     95% C.I. for mu(1,1,3)-mu(2,3,2)
[          -16.2063716344,           -3.22409686820]
   mu(1,1,3)<mu(2,3,2)
     95% C.I. for mu(1,1,3)-mu(2,3,3)
[          -15.4479255609,           -2.46565079460]
   mu(1,1,3)<mu(2,3,3)
     95% C.I. for mu(1,1,3)-mu(2,1,1)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(2,1,1)
     95% C.I. for mu(1,1,3)-mu(2,1,2)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(2,1,2)
     95% C.I. for mu(1,1,3)-mu(2,1,3)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(2,1,3)
     95% C.I. for mu(1,1,3)-mu(3,2,1)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,2,1)
     95% C.I. for mu(1,1,3)-mu(3,2,2)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,2,2)
     95% C.I. for mu(1,1,3)-mu(3,2,3)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,2,3)
     95% C.I. for mu(1,1,3)-mu(3,3,1)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,3,1)
     95% C.I. for mu(1,1,3)-mu(3,3,2)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,3,2)
     95% C.I. for mu(1,1,3)-mu(3,3,3)
[          -13.3024628253,           -0.32018805910]
   mu(1,1,3)<mu(3,3,3)
     95% C.I. for mu(1,2,1)-mu(1,2,2)
[           -6.7502566880,            6.23201807820]
   mu(1,2,1)=mu(1,2,2)


     95% C.I. for mu(1,2,1)-mu(1,2,3)
[           -9.4927958327,            3.48947893350]
   mu(1,2,1)=mu(1,2,3)


     95% C.I. for mu(1,2,1)-mu(2,3,1)
[          -12.3930003122,            0.58927445410]
   mu(1,2,1)=mu(2,3,1)
```

95% C.I. for mu(1,2,1)-mu(2,3,2)
[-12.6268903070, 0.35538445920]
mu(1,2,1)=mu(2,3,2)

95% C.I. for mu(1,2,1)-mu(2,3,3)
[-11.8684442334, 1.11383053280]
mu(1,2,1)=mu(2,3,3)

95% C.I. for mu(1,2,1)-mu(2,1,1)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(2,1,1)

95% C.I. for mu(1,2,1)-mu(2,1,2)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(2,1,2)

95% C.I. for mu(1,2,1)-mu(2,1,3)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(2,1,3)

95% C.I. for mu(1,2,1)-mu(3,2,1)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,2,1)

95% C.I. for mu(1,2,1)-mu(3,2,2)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,2,2)

95% C.I. for mu(1,2,1)-mu(3,2,3)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,2,3)

95% C.I. for mu(1,2,1)-mu(3,3,1)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,3,1)

95% C.I. for mu(1,2,1)-mu(3,3,2)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,3,2)

95% C.I. for mu(1,2,1)-mu(3,3,3)
[-9.7229814979, 3.25929326840]
mu(1,2,1)=mu(3,3,3)

95% C.I. for mu(1,2,2)-mu(1,2,3)
[-9.2336765278, 3.74859823840]
mu(1,2,2)=mu(1,2,3)

95% C.I. for mu(1,2,2)-mu(2,3,1)
[-12.1338810072, 0.84839375900]
mu(1,2,2)=mu(2,3,1)

95% C.I. for mu(1,2,2)-mu(2,3,2)
[-12.3677710021, 0.61450376420]
mu(1,2,2)=mu(2,3,2)

95% C.I. for mu(1,2,2)-mu(2,3,3)
[-11.6093249285, 1.37294983770]
mu(1,2,2)=mu(2,3,3)

95% C.I. for mu(1,2,2)-mu(2,1,1)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(2,1,1)

95% C.I. for mu(1,2,2)-mu(2,1,2)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(2,1,2)

95% C.I. for mu(1,2,2)-mu(2,1,3)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(2,1,3)

95% C.I. for mu(1,2,2)-mu(3,2,1)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,2,1)

95% C.I. for mu(1,2,2)-mu(3,2,2)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,2,2)

95% C.I. for mu(1,2,2)-mu(3,2,3)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,2,3)

95% C.I. for mu(1,2,2)-mu(3,3,1)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,3,1)

95% C.I. for mu(1,2,2)-mu(3,3,2)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,3,2)

95% C.I. for mu(1,2,2)-mu(3,3,3)
[-9.4638621929, 3.51841257330]
mu(1,2,2)=mu(3,3,3)

95% C.I. for mu(1,2,3)-mu(2,3,1)
[-9.3913418625, 3.59093290370]
mu(1,2,3)=mu(2,3,1)

95% C.I. for mu(1,2,3)-mu(2,3,2)
[-9.6252318574, 3.35704290890]
mu(1,2,3)=mu(2,3,2)

95% C.I. for mu(1,2,3)-mu(2,3,3)
[-8.8667857838, 4.11548898240]
mu(1,2,3)=mu(2,3,3)

95% C.I. for mu(1,2,3)-mu(2,1,1)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(2,1,1)

95% C.I. for mu(1,2,3)-mu(2,1,2)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(2,1,2)

95% C.I. for mu(1,2,3)-mu(2,1,3)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(2,1,3)

95% C.I. for mu(1,2,3)-mu(3,2,1)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,2,1)

95% C.I. for mu(1,2,3)-mu(3,2,2)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,2,2)

95% C.I. for mu(1,2,3)-mu(3,2,3)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,2,3)

95% C.I. for mu(1,2,3)-mu(3,3,1)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,3,1)

95% C.I. for mu(1,2,3)-mu(3,3,2)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,3,2)

95% C.I. for mu(1,2,3)-mu(3,3,3)
[-6.7213230483, 6.26095171800]
mu(1,2,3)=mu(3,3,3)

95% C.I. for mu(1,3,1)-mu(2,3,2)
[-6.7250273780, 6.25724738830]
mu(1,3,1)=mu(2,3,2)

95% C.I. for mu(1,3,1)-mu(2,3,3)
[-5.9665813044, 7.01569346180]
mu(1,3,1)=mu(2,3,3)

95% C.I. for mu(1,3,1)-mu(2,1,1)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(2,1,1)

95% C.I. for mu(1,3,1)-mu(2,1,2)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(2,1,2)

95% C.I. for mu(1,3,1)-mu(2,1,3)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(2,1,3)

95% C.I. for mu(1,3,1)-mu(3,2,1)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,2,1)

95% C.I. for mu(1,3,1)-mu(3,2,2)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,2,2)

95% C.I. for mu(1,3,1)-mu(3,2,3)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,2,3)

95% C.I. for mu(1,3,1)-mu(3,3,1)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,3,1)

95% C.I. for mu(1,3,1)-mu(3,3,2)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,3,2)

95% C.I. for mu(1,3,1)-mu(3,3,3)
[-3.8211185688, 9.16115619740]
mu(1,3,1)=mu(3,3,3)

95% C.I. for mu(1,3,2)-mu(2,3,3)
[-5.7326913096, 7.24958345670]
mu(1,3,2)=mu(2,3,3)

95% C.I. for mu(1,3,2)-mu(2,1,1)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(2,1,1)

95% C.I. for mu(1,3,2)-mu(2,1,2)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(2,1,2)

95% C.I. for mu(1,3,2)-mu(2,1,3)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(2,1,3)

95% C.I. for mu(1,3,2)-mu(3,2,1)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,2,1)

95% C.I. for mu(1,3,2)-mu(3,2,2)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,2,2)

95% C.I. for mu(1,3,2)-mu(3,2,3)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,2,3)

95% C.I. for mu(1,3,2)-mu(3,3,1)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,3,1)

95% C.I. for mu(1,3,2)-mu(3,3,2)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,3,2)

95% C.I. for mu(1,3,2)-mu(3,3,3)
[-3.5872285740, 9.39504619220]
mu(1,3,2)=mu(3,3,3)

95% C.I. for mu(1,3,3)-mu(2,1,1)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(2,1,1)

95% C.I. for mu(1,3,3)-mu(2,1,2)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(2,1,2)

95% C.I. for mu(1,3,3)-mu(2,1,3)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(2,1,3)

95% C.I. for mu(1,3,3)-mu(3,2,1)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,2,1)

95% C.I. for mu(1,3,3)-mu(3,2,2)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,2,2)

95% C.I. for mu(1,3,3)-mu(3,2,3)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,2,3)

95% C.I. for mu(1,3,3)-mu(3,3,1)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,3,1)

95% C.I. for mu(1,3,3)-mu(3,3,2)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,3,2)

95% C.I. for mu(1,3,3)-mu(3,3,3)
[-4.3456746476, 8.63660011870]
mu(1,3,3)=mu(3,3,3)

95% C.I. for mu(2,1,1)-mu(2,1,2)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(2,1,2)

95% C.I. for mu(2,1,1)-mu(2,1,3)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(2,1,3)

95% C.I. for mu(2,1,1)-mu(3,2,1)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,2,1)

95% C.I. for mu(2,1,1)-mu(3,2,2)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,2,2)

95% C.I. for mu(2,1,1)-mu(3,2,3)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,2,3)

95% C.I. for mu(2,1,1)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,3,1)

95% C.I. for mu(2,1,1)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,3,2)

95% C.I. for mu(2,1,1)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,1,1)=mu(3,3,3)

95% C.I. for mu(2,1,2)-mu(2,1,3)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(2,1,3)

95% C.I. for mu(2,1,2)-mu(3,2,1)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,2,1)

95% C.I. for mu(2,1,2)-mu(3,2,2)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,2,2)

95% C.I. for mu(2,1,2)-mu(3,2,3)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,2,3)

95% C.I. for mu(2,1,2)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,3,1)

95% C.I. for mu(2,1,2)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,3,2)

95% C.I. for mu(2,1,2)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,1,2)=mu(3,3,3)

95% C.I. for mu(2,1,3)-mu(3,2,1)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,2,1)

95% C.I. for mu(2,1,3)-mu(3,2,2)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,2,2)

95% C.I. for mu(2,1,3)-mu(3,2,3)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,2,3)

95% C.I. for mu(2,1,3)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,3,1)

95% C.I. for mu(2,1,3)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,3,2)

95% C.I. for mu(2,1,3)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,1,3)=mu(3,3,3)

95% C.I. for mu(2,2,1)-mu(3,2,2)
[-6.4911373831, 6.49113738310]
mu(2,2,1)=mu(3,2,2)

95% C.I. for mu(2,2,1)-mu(3,2,3)
[-6.4911373831, 6.49113738310]
mu(2,2,1)=mu(3,2,3)

95% C.I. for mu(2,2,1)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,2,1)=mu(3,3,1)

95% C.I. for mu(2,2,1)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,2,1)=mu(3,3,2)

95% C.I. for mu(2,2,1)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,2,1)=mu(3,3,3)

95% C.I. for mu(2,2,2)-mu(3,2,3)
[-6.4911373831, 6.49113738310]
mu(2,2,2)=mu(3,2,3)

95% C.I. for mu(2,2,2)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,2,2)=mu(3,3,1)

95% C.I. for mu(2,2,2)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,2,2)=mu(3,3,2)

95% C.I. for mu(2,2,2)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,2,2)=mu(3,3,3)

95% C.I. for mu(2,2,3)-mu(3,3,1)
[-6.4911373831, 6.49113738310]
mu(2,2,3)=mu(3,3,1)

95% C.I. for mu(2,2,3)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,2,3)=mu(3,3,2)

95% C.I. for mu(2,2,3)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,2,3)=mu(3,3,3)

95% C.I. for mu(2,3,1)-mu(3,3,2)
[-6.4911373831, 6.49113738310]
mu(2,3,1)=mu(3,3,2)

95% C.I. for mu(2,3,1)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,3,1)=mu(3,3,3)

95% C.I. for mu(2,3,2)-mu(3,3,3)
[-6.4911373831, 6.49113738310]
mu(2,3,2)=mu(3,3,3)

~~~~~~~~~~~~ error ~~~~~~~~~~~~

A1 B1 C1|	1.84869,	-0.09497,	-4.11284,	1.46307,	0.89606,
A1 B1 C2|	6.78689,	-4.70041,	-2.45228,	9.56066,	-9.19486,
A1 B1 C3|	1.74793,	2.25059,	-1.49844,	-2.90706,	0.40697,
A1 B2 C1|	0.07491,	-1.23987,	-1.21284,	-3.97808,	6.35588,
A1 B2 C2|	-0.50562,	-4.45691,	-2.14427,	-0.42230,	7.52909,
A1 B2 C3|	3.14833,	-0.10479,	0.36511,	-2.36725,	-1.04140,
A1 B3 C1|	0.52636,	-3.42215,	3.52118,	5.07577,	-5.70116,
A1 B3 C2|	-3.92560,	-7.77940,	5.68103,	-2.79814,	8.82211,
A1 B3 C3|	2.06278,	1.88736,	-7.76898,	-6.98234,	10.80117,
A2 B1 C1|	-1.34027,	7.34699,	4.90375,	-4.35794,	-6.55252,
A2 B1 C2|	-1.77499,	-2.10380,	-0.40900,	2.81725,	1.47053,
A2 B1 C3|	-8.67946,	-0.85235,	-0.18921,	3.12276,	6.59826,
A2 B2 C1|	-4.20889,	7.19137,	1.53486,	3.00545,	-7.52279,
A2 B2 C2|	0.95838,	-5.80386,	1.96374,	4.09085,	-1.20910,
A2 B2 C3|	-4.17626,	-6.59487,	2.76299,	1.07491,	6.93323,
A2 B3 C1|	-3.98115,	-11.84150,	4.70699,	6.07951,	5.03615,
A2 B3 C2|	3.61581,	0.72797,	-4.98141,	1.25437,	-0.61674,
A2 B3 C3|	0.68428,	0.36513,	-4.41628,	6.18699,	-2.82013,

The common population standard deviation and variance confidence interval
90% confidence interval for population variance
[20.559957 , 35.692019]
90% confidence interval for population standard deviation
[4.534309 , 5.974280]
95% confidence interval for population variance
[19.599748 , 37.839550]
95% confidence interval for population standard deviation
[4.427160 , 6.151386]
99% confidence interval for population variance
[17.890287 , 42.552799]
99% confidence interval for population standard deviation
[4.229691 , 6.523251]
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