

```
%%%%%%%%%%  
LATIN SQUARES
```

```
%%%%%%%%%%  
DATA
```

```
%%%%%%%%%%
```

```
> week_rep(1:4,rep(4,4))
```

```
> week
```

```
[1] 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4
```

```
> inf_rep(1:4,4)
```

```
> inf
```

```
[1] 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
```

```
> form_c("2","3","1","4","3","4","2","1","4","1","3","2","1","2","4","3")
```

```
> form
```

```
[1] "2" "3" "1" "4" "3" "4" "2" "1" "4" "1" "3" "2" "1" "2" "4" "3"
```

```
> matrix(form,4,4,byrow=F)
```

```
  [,1] [,2] [,3] [,4]
```

```
[1,] "2" "3" "4" "1"
```

```
[2,] "3" "4" "1" "2"
```

```
[3,] "1" "2" "3" "4"
```

```
[4,] "4" "1" "2" "3"
```

```
> res_c(.4,.2,1.14,1.08,1.11,1.04,1.11,1.34,1.16,.57,1.32,1.73,.88,.8,1.38,1.55)
```

```
> res
```

```
[1] 0.40 0.20 1.14 1.08 1.11 1.04 1.11 1.34 1.16 0.57 1.32 1.73 0.88 0.80 1.38 1.55
```

```
> week_as.factor(week)
```

```
> inf_as.factor(inf)
```

```
> LS1.df_data.frame(res,week,inf,form)
```

```
> LS1.df
```

```
  res week inf form
```

```
1 0.40  1  1  2
```

```
2 0.20  1  2  3
```

```
3 1.14  1  3  1
```

```
4 1.08  1  4  4
```

```
5 1.11  2  1  3
```

```
6 1.04  2  2  4
```

```
7 1.11  2  3  2
```

```
8 1.34  2  4  1
```

```
9 1.16  3  1  4
```

```
10 0.57  3  2  1
```

```
11 1.32  3  3  3
```

```
12 1.73  3  4  2
```

```
13 0.88  4  1  1
```

```
14 0.80  4  2  2
```

```
15 1.38  4  3  4
```

```
16 1.55  4  4  3
```

```
%%%%%%%%%%
```

```
A FIRST LOOK AT THE DATA
```

```
%%%%%%%%%%>
```

```
tapply(LS1.df$res,list(LS1.df$inf),mean)
```

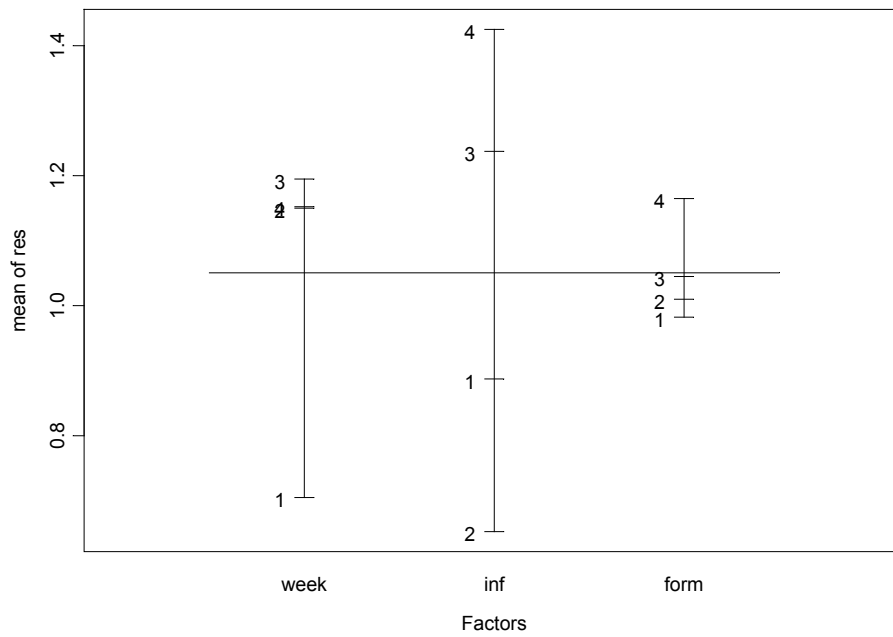
```
  1  2  3  4
```

```
0.8875 0.6525 1.2375 1.425
```

```

> tapply(LS1.df$res,list(LS1.df$week),mean)
 1  2  3  4
0.705 1.15 1.195 1.1525
> tapply(LS1.df$res,list(LS1.df$form),mean)
 1  2  3  4
0.9825 1.01 1.045 1.165
> tapply(LS1.df$res,list(LS1.df$form),var)^.5
 1  2  3  4
0.3333042 0.5611298 0.591298 0.1517674
> plot.design(LS1.df)

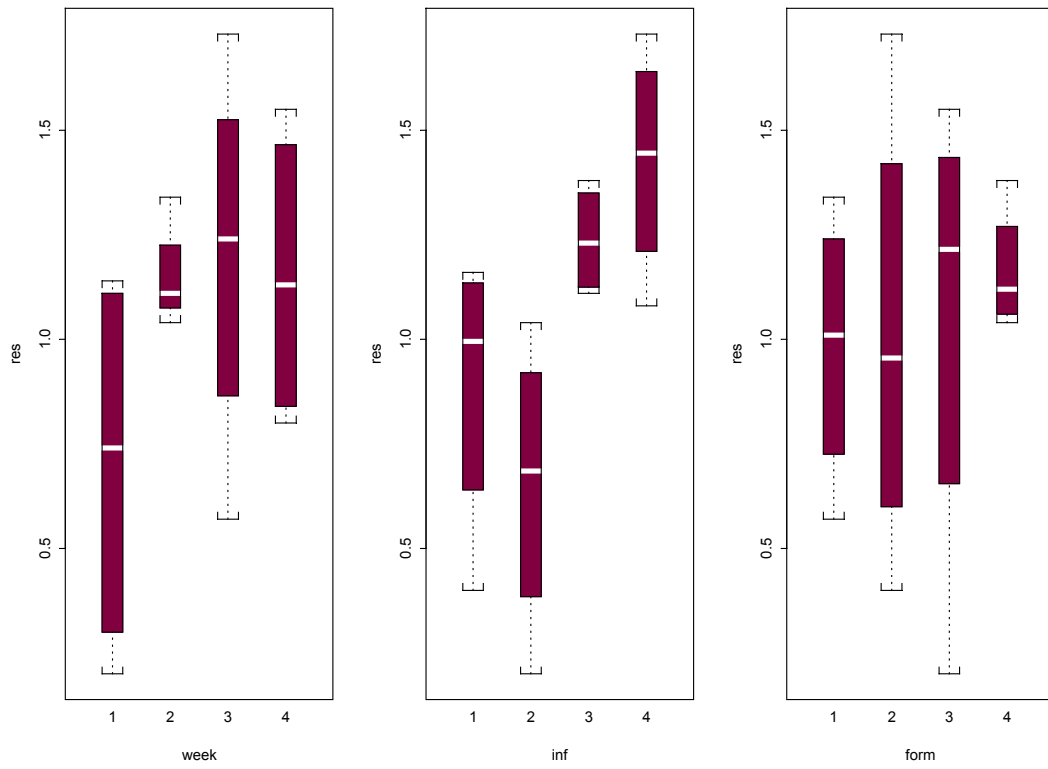
```



```

> par(mfrow=c(1,3))
> plot.factor(LS1.df)

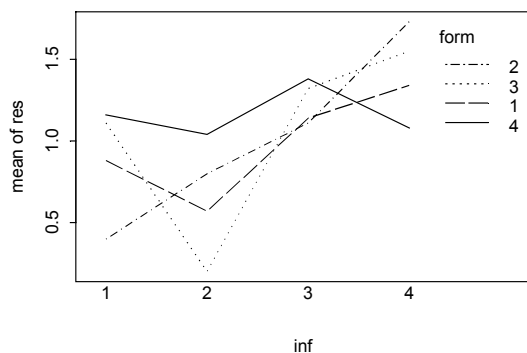
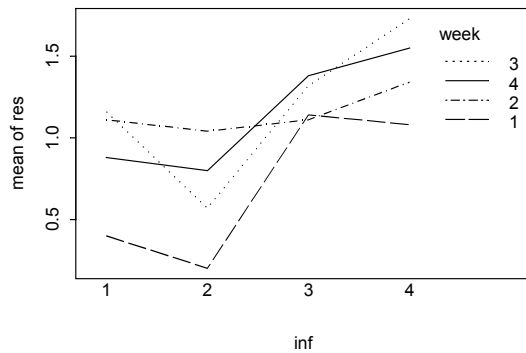
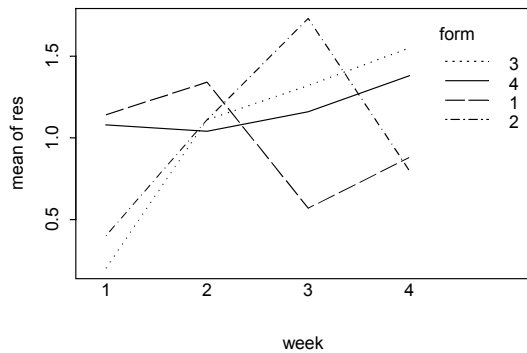
```



```

> par(mfrow=c(2,2))
> attach(LS1.df)
> interaction.plot(week, form, res)
> interaction.plot(inf, week, res)
> interaction.plot(inf, form, res)
> detach()

```



ANALYSIS

> LS1.aov_aov(res~week+inf+form,LS1.df)

> summary(LS1.aov)

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
week	3	0.642219	0.2140729	4.105110	0.0667357
inf	3	1.440769	0.4802562	9.209500	0.0115611
form	3	0.077619	0.0258729	0.496145	0.6982155

Residuals 6 0.312887 0.0521479

> RE_100*(SLS1[1,3]+SLS1[1,1]*SLS1[4,3])/(SLS1[1,1]+1)/SLS1[4,3]

> RE

[1] 177.6277

REPLICATED LATIN SQUARE

DATA

> infl_rep(1:4,16)

> week1_rep(rep(1:4,rep(4,4)),4)

> res1_c(LS1.df[1:16,1])

> res12_c(1.55,.11,.22,.53,.89,1.05,.96,1.25,.16,.68,1.45,.61,.55,.98,.82,1.91)

> res13_c(.27,.5,.32,.09,1.16,.7,1.63,.3,.59,.93,.55,1.34,.45,.96,.79,1.09)

> res14_c(.73,.64,-.03,1.05,1.21,1.38,1.04,1.11,1.21,.82,-.57,1.77,-.79,.55,.5)

```

> res11_res1
> res1_c(res11,res12,res13,res14)
> squar_c(1:4,rep(16,4))

> inf1_as.factor(inf1)
> week1_as.factor(week1)
> squar_as.factor(squar)
> infsqu_c(rep(1:4,4),rep(5:8,4),rep(9:12,4),rep(13:16,4))
> infsqu_as.factor(infsqu)
> LS2.df_data.frame(res1,week1,inf1,form1,squar,infsqu)

```

```

LS2.df
  res1 week1 inf1 form1 squar infsqu
1 0.40    1    1     2     1     1
2 0.20    1    2     3     1     2
3 1.14    1    3     1     1     3
4 1.08    1    4     4     1     4
5 1.11    2    1     3     1     1
6 1.04    2    2     4     1     2
7 1.11    2    3     2     1     3
8 1.34    2    4     1     1     4
9 1.16    3    1     4     1     1
10 0.57    3    2     1     1     2
11 1.32    3    3     3     1     3
12 1.73    3    4     2     1     4
13 0.88    4    1     1     1     1
14 0.80    4    2     2     1     2
15 1.38    4    3     4     1     3
16 1.55    4    4     3     1     4
17 1.55    1    1     2     2     5
18 0.11    1    2     3     2     6
19 0.22    1    3     1     2     7
20 0.53    1    4     4     2     8
21 0.89    2    1     3     2     5
22 1.05    2    2     4     2     6
23 0.96    2    3     2     2     7
24 1.25    2    4     1     2     8
25 0.16    3    1     4     2     5
26 0.68    3    2     1     2     6
27 1.45    3    3     3     2     7
28 0.61    3    4     2     2     8
29 0.55    4    1     1     2     5
30 0.98    4    2     2     2     6
31 0.82    4    3     4     2     7
32 1.91    4    4     3     2     8
33 0.27    1    1     2     3     9
34 0.50    1    2     3     3    10
35 0.32    1    3     1     3    11
36 0.09    1    4     4     3    12
37 1.16    2    1     3     3     9
38 0.70    2    2     4     3    10

```

39	1.63	2	3	2	3	11
40	0.30	2	4	1	3	12
41	0.59	3	1	4	3	9
42	0.93	3	2	1	3	10
43	0.55	3	3	3	3	11
44	1.34	3	4	2	3	12
45	0.45	4	1	1	3	9
46	0.96	4	2	2	3	10
47	0.79	4	3	4	3	11
48	1.09	4	4	3	3	12
49	0.73	1	1	2	4	13
50	0.64	1	2	3	4	14
51	-0.03	1	3	1	4	15
52	1.05	1	4	4	4	16
53	1.21	2	1	3	4	13
54	1.38	2	2	4	4	14
55	1.04	2	3	2	4	15
56	1.11	2	4	1	4	16
57	1.21	3	1	4	4	13
58	0.82	3	2	1	4	14
59	0.57	3	3	3	4	15
60	1.00	3	4	2	4	16
61	0.77	4	1	1	4	13
62	0.79	4	2	2	4	14
63	0.55	4	3	4	4	15
64	0.50	4	4	3	4	16

%%%

ANALYSIS

%%%

> LS2.aov_aov(res1~infsqu+week1+form1,LS2.df)

> summary(LS2.aov)

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
infsqu	15	3.195644	0.2130429	1.632669	0.1057655
week1	3	2.425906	0.8086354	6.197034	0.0013903
form1	3	0.725069	0.2416896	1.852205	0.1524429
Residuals	42	5.480475	0.1304875		