

Example 17.3 Pages 1053-1056

2-way random effects ...

```
options nodate nonumber ls=80 nocenter;
data calcium;
input assay lab content @@;
cards;
1 1 10.9 1 1 10.9 1 2 10.5 1 2 9.8 1 3 9.7 1 3 10.0
2 1 11.3 2 1 11.7 2 2 9.4 2 2 10.2 2 3 8.8 2 3 9.2
3 1 11.8 3 1 11.2 3 2 10.0 3 2 10.7 3 3 10.4 3 3 10.7
;
```

```
proc glm;
class assay lab;
model content = assay lab assay*lab;
random assay lab assay*lab;
test h=assay e=assay*lab;
test h=lab e=assay*lab;
run;
```

Source	DF	Type III SS	Mean Square	F Value	Pr > F
assay	2	1.56000000	0.78000000	5.66	0.0256
lab	2	7.56000000	3.78000000	27.44	0.0001
assay*lab	4	1.64000000	0.41000000	2.98	0.0803

Dependent Variable: content

Tests of Hypotheses Using the Type III MS for assay*lab as an Error Term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
assay	2	1.56000000	0.78000000	1.90	0.2627
lab	2	7.56000000	3.78000000	9.22	0.0318

```

proc glm;
class assay lab;
model content = assay lab assay*lab;
random assay lab assay*lab / test;
run;

```

Source	DF	Type III SS	Mean Square	F Value	Pr > F
assay	2	1.56000000	0.78000000	5.66	0.0256
lab	2	7.56000000	3.78000000	27.44	0.0001
assay*lab	4	1.64000000	0.41000000	2.98	0.0803

Source	Type III Expected Mean Square
assay	Var(Error) + 2 Var(assay*lab) + 6 Var(assay)
lab	Var(Error) + 2 Var(assay*lab) + 6 Var(lab)
assay*lab	Var(Error) + 2 Var(assay*lab)

Tests of Hypotheses for Random Model Analysis of Variance

Dependent Variable: content

Source	DF	Type III SS	Mean Square	F Value	Pr > F
assay	2	1.560000	0.780000	1.90	0.2627
lab	2	7.560000	3.780000	9.22	0.0318
Error: MS(assay*lab)	4	1.640000	0.410000		

Source	DF	Type III SS	Mean Square	F Value	Pr > F
assay*lab	4	1.640000	0.410000	2.98	0.0803
Error: MS(Error)	9	1.240000	0.137778		