

```

data one;
do seq='abc', 'bca', 'cab', 'acb', 'bac', 'cba';
do rep=1,2;
do period=1,2,3;
input trt $ y carry @@; carry2=carry*carry; output;
end; end; end; datalines;
a 50 0 b 61 1 c 53 2 a 55 0 b 63 1 c 57 2
b 44 0 c 42 2 a 57 3 b 51 0 c 46 2 a 59 3
c 35 0 a 55 3 b 47 1 c 41 0 a 56 3 b 50 1
a 54 0 c 48 1 b 51 3 a 58 0 c 51 1 b 54 3
b 50 0 a 57 2 c 51 1 b 55 0 a 57 2 c 55 1
c 41 0 b 56 3 a 58 2 c 46 0 b 58 3 a 61 2
;
proc glm;
class seq rep period trt carry;
model y=seq rep(seq) period trt carry;
test h=seq e=rep(seq);
*lsmeans trt/pdiff; **doesnt work**;
run;
proc glm;
class seq rep period trt;
model y=seq rep(seq) period trt carry carry2;
test h=seq e=rep(seq);
means trt/tukey;
lsmeans trt/pdiff;
run;

```

Class Level Information

Class	Levels	Values
seq	6	abc acb bac bca cab cba
rep	2	1 2
period	3	1 2 3
trt	3	a b c
carry	4	0 1 2 3

Number of Observations Read	36
Number of Observations Used	36

Dependent Variable: y

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	17	1267.513889	74.559641	7.89	<.0001
Error	18	170.125000	9.451389		
Corrected Total	35	1437.638889			

R-Square	Coeff Var	Root MSE	y Mean
0.881664	5.877600	3.074311	52.30556

Source	DF	Type I SS	Mean Square	F Value	Pr > F
seq	5	318.4722222	63.6944444	6.74	0.0011
rep(seq)	6	111.8333333	18.6388889	1.97	0.1235
period	2	284.3888889	142.1944444	15.04	0.0001
trt	2	532.3888889	266.1944444	28.16	<.0001
carry	2	20.4305556	10.2152778	1.08	0.3603

Source	DF	Type III SS	Mean Square	F Value	Pr > F
seq	5	317.0916667	63.4183333	6.71	0.0011
rep(seq)	6	111.8333333	18.6388889	1.97	0.1235
period	1	0.3750000	0.3750000	0.04	0.8443
trt	2	425.4750000	212.7375000	22.51	<.0001
carry	2	20.4305556	10.2152778	1.08	0.3603

Tests of Hypotheses Using the Type III MS for rep(seq) as an Error Term					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
seq	5	317.0916667	63.4183333	3.40	0.0840

The GLM Procedure						
Class Level Information						
Class	Levels	Values				
seq	6	abc	acb	bac	bca	cab cba
rep	2	1	2			
period	3	1	2	3		
trt	3	a	b	c		
Number of Observations Read				36		
Number of Observations Used				36		
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F	
Model	17	1267.513889	74.559641	7.89	<.0001	
Error	18	170.125000	9.451389			
Corrected Total	35	1437.638889				
	R-Square	Coeff Var	Root MSE	y Mean		
	0.881664	5.877600	3.074311	52.30556		
Source	DF	Type I SS	Mean Square	F Value	Pr > F	
seq	5	318.4722222	63.6944444	6.74	0.0011	
rep(seq)	6	111.8333333	18.6388889	1.97	0.1235	
period	2	284.3888889	142.1944444	15.04	0.0001	
trt	2	532.3888889	266.1944444	28.16	<.0001	
carry	1	0.3750000	0.3750000	0.04	0.8443	
carry2	1	20.0555556	20.0555556	2.12	0.1624	
Source	DF	Type III SS	Mean Square	F Value	Pr > F	
seq	5	317.0916667	63.4183333	6.71	0.0011	
rep(seq)	6	111.8333333	18.6388889	1.97	0.1235	
period	2	56.3922414	28.1961207	2.98	0.0760	
trt	2	425.4750000	212.7375000	22.51	<.0001	
carry	1	20.4294218	20.4294218	2.16	0.1588	
carry2	1	20.0555556	20.0555556	2.12	0.1624	
Tests of Hypotheses Using the Type III MS for rep(seq) as an Error Term						
Source	DF	Type III SS	Mean Square	F Value	Pr > F	
seq	5	317.0916667	63.4183333	3.40	0.0840	
Tukey's Studentized Range (HSD) Test for y						
NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.						
Alpha		0.05				
Error Degrees of Freedom		18				
Error Mean Square		9.451389				
Critical Value of Studentized Range		3.60930				
Minimum Significant Difference		3.2032				
Means with the same letter are not significantly different.						

Tukey Grouping	Mean	N	trt
A	56.417	12	a
A			
A	53.333	12	b
B	47.167	12	c

Least Squares Means

trt	y LSMEAN	LSMEAN Number
a	56.7430556	1
b	52.8055556	2
c	47.3680556	3

Least Squares Means for effect trt
Pr > |t| for H0: LSMean(i)=LSMean(j)

Dependent Variable: y			
i/j	1	2	3
1		0.0117	<.0001
2	0.0117		0.0011
3	<.0001	0.0011	

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

