

```

title1 'Analysis of Covariance - Oyster Data';
title2 'consider final-initial';
options nodate nonumber ls=80 nocenter;
data oyster;
input trt  initial  final @@;
increase = final - initial;
datalines;
1      27.2    32.6      1      32.0    36.6
1      33.0    37.7      1      26.8    31.0
2      28.6    33.8      2      26.8    31.7
2      26.5    30.7      2      26.8    30.4
3      28.6    35.2      3      22.4    29.1
3      23.2    28.9      3      24.4    30.2
4      29.3    35.0      4      21.8    27.0
4      30.3    36.4      4      24.3    30.5
5      20.4    24.6      5      19.6    23.4
5      25.1    30.3      5      18.1    21.8
;

proc gplot;
plot increase*trt;
run;

proc glm data=oyster;
class trt;
model increase = trt;
lsmeans trt /pdiff cl adj=bon lines;
run;

```

Analysis of Covariance - Oyster Data
consider final-initial

The GLM Procedure

Class Level Information

Class	Levels	Values
trt	5	1 2 3 4 5

Number of Observations Read	20
Number of Observations Used	20

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The GLM Procedure

Dependent Variable: increase

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	11.98300000	2.99575000	8.74	0.0008
Error	15	5.14250000	0.34283333		
Corrected Total	19	17.12550000			

R-Square	Coeff Var	Root MSE	increase Mean
0.699717	11.51465	0.585520	5.085000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	4	11.98300000	2.99575000	8.74	0.0008

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	4	11.98300000	2.99575000	8.74	0.0008

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The GLM Procedure

Least Squares Means

Adjustment for Multiple Comparisons: Bonferroni

trt	increase LSMEAN	LSMEAN Number
1	4.72500000	1
2	4.47500000	2
3	6.20000000	3
4	5.80000000	4
5	4.22500000	5

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

Dependent Variable: increase

i/j	1	2	3	4	5
1		1.0000	0.0284	0.2024	1.0000
2	1.0000		0.0083	0.0596	1.0000
3	0.0284	0.0083		1.0000	0.0025
4	0.2024	0.0596	1.0000		0.0173
5	1.0000	1.0000	0.0025	0.0173	

trt	increase LSMEAN	95% Confidence Limits	
1	4.725000	4.100997	5.349003
2	4.475000	3.850997	5.099003
3	6.200000	5.575997	6.824003
4	5.800000	5.175997	6.424003
5	4.225000	3.600997	4.849003

Least Squares Means for Effect trt

i	j	Difference Between Means	Simultaneous 95% Confidence Limits for LSMean(i)-LSMean(j)	
1	2	0.250000	-1.110502	1.610502
1	3	-1.475000	-2.835502	-0.114498
1	4	-1.075000	-2.435502	0.285502
1	5	0.500000	-0.860502	1.860502
2	3	-1.725000	-3.085502	-0.364498
2	4	-1.325000	-2.685502	0.035502
2	5	0.250000	-1.110502	1.610502
3	4	0.400000	-0.960502	1.760502
3	5	1.975000	0.614498	3.335502
4	5	1.575000	0.214498	2.935502

Bonferroni Comparison Lines for Least Squares Means of trt

LS-means with the same letter are not significantly different.

	increase LSMEAN	trt	LSMEAN Number
A	6.200	3	3
A			
B	5.800	4	4
B			
B	4.725	1	1
B			
B	4.475	2	2
C			
C	4.225	5	5

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