```
/*  SAS program for Latin square, using data  */
/*  from example 15.5, p. 884.  Row variable  */
/*  is problem type, col variable is sec-     */
/*  retary, and treatment is spreadsheet.     */
/*  Response was time (in hours) to complete  */
/*  task.                                     */

options nocenter ls=72;
data;
  input y trt $ row col;
  cards;
  0.3 a 1 1
  1.8 b 1 2
  0.7 c 1 3
  1.2 d 1 4
  1.4 b 2 1
  1.4 c 2 2
  1.1 d 2 3
  0.5 a 2 4
  0.5 c 3 1
  1.5 d 3 2
  0.5 a 3 3
  1.1 b 3 4
  1.0 d 4 1
  0.5 a 4 2
  1.7 b 4 3
  1.6 c 4 4
  ;
proc glm;
  class trt row col;
  model y=row col trt;
  contrast 'a v b' trt 1 -1 0 0;
  contrast 'a v c' trt 1 0 -1 0;
  contrast 'a v d' trt 1 0 0 -1;
  contrast 'b v c' trt 0 1 -1 0;
  contrast 'b v d' trt 0 1 0 -1;
  contrast 'c v d' trt 0 0 1 -1;
  output out=new predicted=yhat residuals=res;
proc rank normal=blom;
  var res;
  ranks nscore;
proc plot;
  plot nscore*res;
  plot res*yhat;
run;
```

The GLM Procedure

Class Level Information

Class	Levels	Values
trt	4	a b c d
row	4	1 2 3 4
col	4	1 2 3 4

Number of observations 16

Dependent Variable: y

Source	DF	Sum of Squares	Mean Square	F Value
Model	9	3.06000000	0.34000000	3.40
Error	6	0.60000000	0.10000000	
Corrected Total	15	3.66000000		

Source	Pr > F
Model	0.0751
Error	
Corrected Total	

R-Square	Coeff Var	Root MSE	y Mean
0.836066	30.11693	0.316228	1.050000

Source	DF	Type I SS	Mean Square	F Value
row	3	0.20000000	0.06666667	0.67
col	3	0.52000000	0.17333333	1.73
trt	3	2.34000000	0.78000000	7.80

Source	Pr > F
row	0.6025
col	0.2592
trt	0.0171

Source	DF	Type III SS	Mean Square	F Value
row	3	0.20000000	0.06666667	0.67
col	3	0.52000000	0.17333333	1.73

Source	Pr > F
row	0.6025
col	0.2592

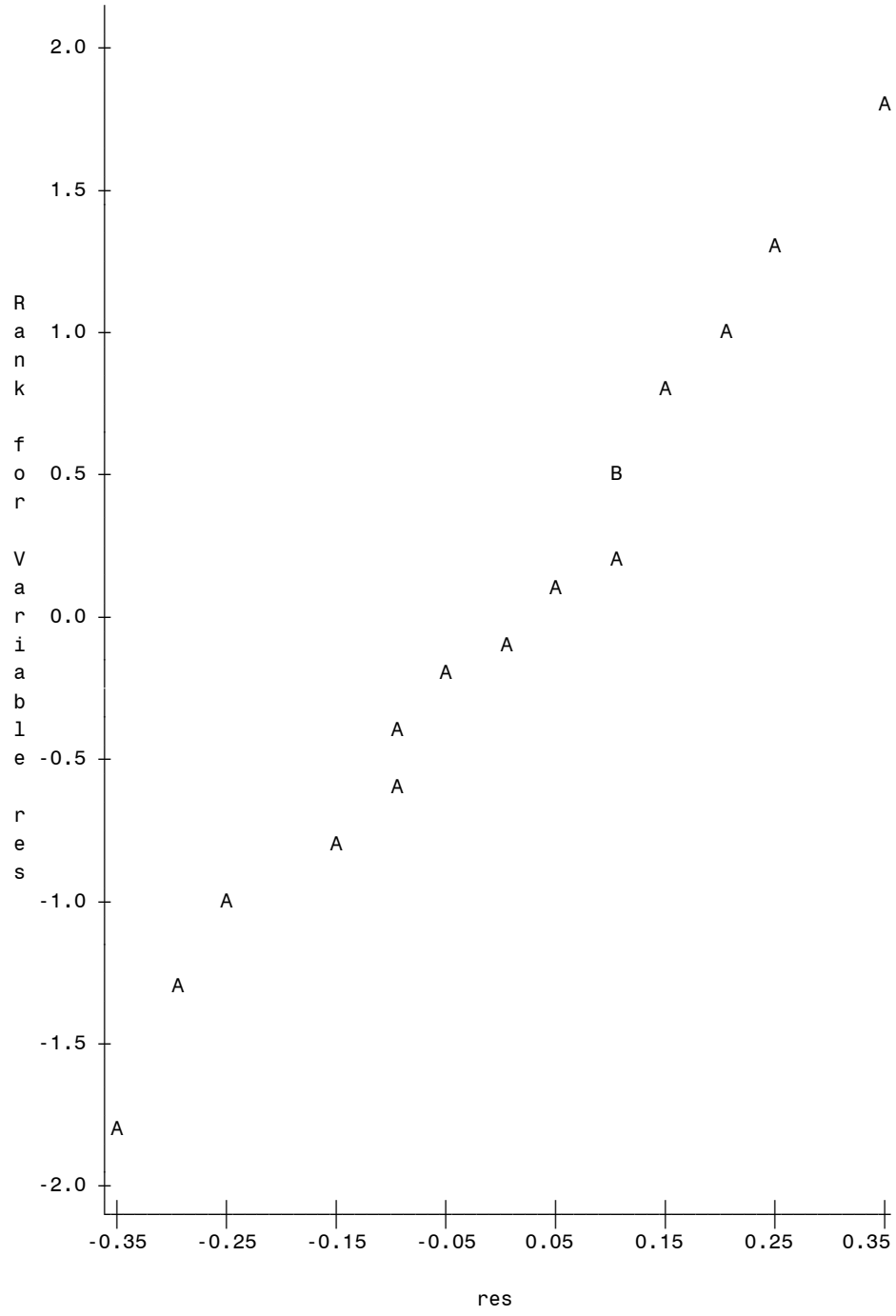
Dependent Variable: y

Source	DF	Type III SS	Mean Square	F Value
trt	3	2.34000000	0.78000000	7.80

Source	Pr > F
trt	0.0171

Contrast	DF	Contrast SS	Mean Square	F Value
a v b	1	2.20500000	2.20500000	22.05
a v c	1	0.72000000	0.72000000	7.20
a v d	1	1.12500000	1.12500000	11.25
b v c	1	0.40500000	0.40500000	4.05
b v d	1	0.18000000	0.18000000	1.80
c v d	1	0.04500000	0.04500000	0.45

Contrast	Pr > F
a v b	0.0033
a v c	0.0364
a v d	0.0153
b v c	0.0908
b v d	0.2283
c v d	0.5273


Plot of nscore*res. Legend: A = 1 obs, B = 2 obs, etc.
Rank for Variable res
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-0.35
-0.25
-0.15
-0.05
0.05
0.15
0.25
0.35
res

Plot of res*yhat. Legend: A = 1 obs, B = 2 obs, etc.