

```

OPTIONS LS=80 PS=66 MPRINT NODATE PAGENO=1 NOCENTER;          (ch8-6-LSDx_HO.out)
DM "LIST; CLEAR; LOG; CLEAR;";
*-----;
FILENAME file1 URL "http://www.uvm.edu/~rsingle/stat231/data/kuehl/exp8_2.txt";

```

```

DATA a2;
  INFILE file1 FIRSTOBS=2 EXPANDTABS;
  INPUT row col rate_level trt yield;
  RUN;

PROC GLM DATA = a2;
  CLASS row col trt;
  MODEL yield = row col trt;
  CONTRAST 'linear' trt -2 -1 0 1 2;
  CONTRAST 'quadratic' trt 2 -1 -2 -1 2;
  CONTRAST 'cubic' trt -1 2 0 -2 1;
  CONTRAST 'quartic' trt 1 -4 6 -4 1;
  OUTPUT OUT=a2_out PREDICTED=pred RESIDUAL=resid;
  RUN;

PROC GPLOT DATA=a2_out;
  PLOT resid*pred resid*row resid*col;
  RUN;

```

Class	Levels	Values
row	5	1 2 3 4 5
col	5	1 2 3 4 5
trt	5	30 80 130 180 230

Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	659.9813120	54.9984427	11.65	<.0001
Error	12	56.6309120	4.7192427		
Corrected Total	24	716.6122240			

R-Square	Coeff Var	Root MSE	yield Mean
0.920974	3.984179	2.172382	54.52520

Source	DF	Type III SS	Mean Square	F Value	Pr > F
row	4	99.2035040	24.8008760	5.26	0.0111
col	4	38.4808240	9.6202060	2.04	0.1527
trt	4	522.2969840	130.5742460	27.67	<.0001

Contrast	DF	Contrast SS	Mean Square	F Value	Pr > F
linear	1	478.5799220	478.5799220	101.41	<.0001
quadratic	1	38.0218300	38.0218300	8.06	0.0149
cubic	1	4.9801680	4.9801680	1.06	0.3246
quartic	1	0.7150640	0.7150640	0.15	0.7039

```

*Linear Regression for the Best Polynomial Equation;
*NOTE: no class statement;
PROC GLM DATA = a2;
  MODEL yield = trt trt*trt;
  RUN;

*Generate data for the plot - seeding rates from 30 to 230 lbs/acre;
DATA poly;
  DO trt=30 TO 230 BY 50;
    y_hat = 42.9732 + 0.13852 * trt -0.000294 * trt*trt;
  OUTPUT;
  END;
  RUN;

TITLE 'Plot of Best Polynomial Fit';
PROC GPLOT DATA=poly;
  SYMBOL1 INTERPOL=SPLINE COLOR=BLACK VALUE=CIRCLE;
  PLOT y_hat * trt;
  RUN;
  QUIT;
SYMBOL1; *NB: clear the definition for future plots;

```

Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	516.6017520	258.3008760	28.41	<.0001
Error	22	200.0104720	9.0913851		
Corrected Total	24	716.6122240			

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	1	478.5799220	478.5799220	52.64	<.0001
trt*trt	1	38.0218300	38.0218300	4.18	0.0530

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	1	118.0751495	118.0751495	12.99	0.0016
trt*trt	1	38.0218300	38.0218300	4.18	0.0530

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	42.97320000	2.12967373	20.18	<.0001
trt	0.13852400	0.03843800	3.60	0.0016
trt*trt	-0.00029480	0.00014415	-2.05	0.0530