

(ch3-2-plant_density_HO.out) OPTIONS LINESIZE = 75 PAGESIZE = 64 NODATE;

```
DATA A;
  INFILE 'plant_density.dat' FIRSTOBS=2;
  INPUT density yield;
  RUN;
```

PROC PRINT Data = A;

```
PROC GLM Data = A;
  CLASS density;
  MODEL yield = density;
  CONTRAST '10 vs. 20' density 1 -1 0 0 0;
  CONTRAST '30 vs. 40' density 0 0 -1 1 0;
  CONTRAST '(30+40)/2 vs. 50' density 0 0 .5 .5 -1;
  CONTRAST '(30+40)/2 vs. 10' density 1 0 -.5 -.5 0;
  RUN;
```

OBS	DENSITY	YIELD	Density	Mean_Yield
1	10	12.2	10	12
2	10	11.4		
3	10	12.4		
4	20	16.0	20	16
5	20	15.5		
6	20	16.5		
7	30	18.6	30	19
8	30	20.2		
9	30	18.2		
10	40	17.6	40	18
11	40	19.3		
12	40	17.1		
13	50	18.0	50	17
14	50	16.4		
15	50	16.6		

```
Class Levels Values
DENSITY 5 10 20 30 40 50
```

Dependent Variable: YIELD

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	87.6000000	21.9000000	29.28	0.0001
Error	10	7.4800000	0.7480000		
Corrected Total	14	95.0800000			

```
R-Square C.V. Root MSE YIELD Mean
0.921329 5.273597 0.86487 16.4000
```

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DENSITY	4	87.6000000	21.9000000	29.28	0.0001

Contrast	DF	Contrast SS	Mean Square	F Value	Pr > F
10 vs. 20	1	24.0000000	24.0000000	32.09	0.0002
30 vs. 40	1	1.5000000	1.5000000	2.01	0.1871
(30+40)/2 vs. 50	1	4.5000000	4.5000000	6.02	0.0341
(30+40)/2 vs. 10	1	84.5000000	84.5000000	112.97	0.0001

```
PROC GLM Data = A;
  CLASS density;
  MODEL yield = density;
  CONTRAST 'linear' density -2 -1 0 1 2;
  CONTRAST 'quadratic' density 2 -1 -2 -1 2;
  CONTRAST 'cubic' density -1 2 0 -2 1;
  CONTRAST 'quartic' density 1 -4 6 -4 1;
  RUN;
```

```
Class Levels Values
DENSITY 5 10 20 30 40 50
```

Dependent Variable: YIELD

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	87.6000000	21.9000000	29.28	0.0001
Error	10	7.4800000	0.7480000		
Corrected Total	14	95.0800000			

```
R-Square C.V. Root MSE YIELD Mean
0.921329 5.273597 0.86487 16.4000
```

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DENSITY	4	87.6000000	21.9000000	29.28	0.0001

Contrast	DF	Contrast SS	Mean Square	F Value	Pr > F
linear	1	43.2000000	43.2000000	57.75	0.0001
quadratic	1	42.0000000	42.0000000	56.15	0.0001
cubic	1	0.3000000	0.3000000	0.40	0.5407
quartic	1	2.1000000	2.1000000	2.81	0.1248

Plot of yield*density. Legend: A = 1 obs, B = 2 obs, etc.

