

```

data codes;
input y group;
*****;
d1=0;d2=0;if group = 1 then d1 = 1;if group = 2 then d2 = 1;
*****;
i0=0;i1=0;i2=0;if group = 0 then i0 = 1;
if group = 1 then i1 = 1;if group = 2 then i2 = 1;
*****;
e1=0;e2=0;
if group = 1 then e1 = -1;if group = 2 then e1 = 1;
if group = 1 then e2 = -1;if group = 3 then e2 = 1;
*****;
group2=group**2;
if group = 0 then line = -1;
if group = 1 then line = 0;if group = 2 then line = 1;
if group = 0 then quad = -1;
if group = 1 then quad = 2;if group = 2 then quad = -1;
*****;
cards;
1 0
2 0
3 0
3 1
3 1
4 1
5 1
5 1
3 2
4 2
4 2
5 2

;proc reg data=codes;
model y = d1 d2/ stb tol vif covb pcorr1 scorrl pcorr2 scorr2; run;
proc reg data=codes;
model y = i0 i1 i2 / noint
stb tol vif covb pcorr1 scorrl pcorr2 scorr2; run;
proc reg data=codes;
model y = i0 i1 i2 /
stb tol vif covb pcorr1 scorrl pcorr2 scorr2;
restrict i0+ i1+ i2 = 0; run;
proc reg data=codes;
model y = e1 e2/
stb tol vif covb pcorr1 scorrl pcorr2 scorr2; run;
proc reg data=codes;
model y = group group2 /
stb tol vif covb pcorr1 scorrl pcorr2 scorr2; run;

```

```

proc iml;
use codes;
read all var{y} into Y;
read all var{d1 d2} into DD;
read all var{i0 i1 i2} into CC;
read all var{e1 e2} into EE;
read all var{group group2} into PP;
read all var{line quad} into OP;
N=nrow(y);
ones=j(N,1,1);
D=ones||DD;
CA=ones||CC;
E=ones||EE;
P=ones||PP;
O=ones||OP;
X=E;
XtX=X`*X;
print X XtX;
XtXi=ginv(XtX);
XtY=X`*y;
b=XtXi*Xty;
print XtXi XtY b;

```

```

proc reg data=codes;
model y = line quad /
stb tol vif covb pcorr1 scorrl pcorr2 scorr2;
run;
proc glm data=codes;class group;
model y = group;means group;
contrast 'Additive' group -1 0 1;
contrast 'Dominance' group 1 -2 1;run;

```

**Reference Cell Coding
Dummy Codes**

The REG Procedure
Model: MODEL1
Dependent Variable: y

```
;proc reg data=codes;
model y = d1 d2/
stb tol vif covb pcorr1 scorr1 pcorr2 scorr2;
run;
```

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000	4.50000	5.06	0.0336
Error	9	8.00000	0.88889		
Corrected Total	11	17.00000			

Root MSE	0.94281	R-Square	0.5294
Dependent Mean	3.50000	Adj R-Sq	0.4248
Coeff Var	26.93740		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I
Intercept	1	2.00000	0.54433	3.67	0.0051	0	.	.
d1	1	2.00000	0.68853	2.90	0.0175	0.82842	0.12605	0.12605
d2	1	2.00000	0.72008	2.78	0.0215	0.79212	0.40336	0.46154

Variable	DF	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	1	.	.	.	0
d1	1	0.44118	0.48387	0.64286	1.55556
d2	1	0.40336	0.46154	0.64286	1.55556

Covariance of Estimates

Variable	Intercept	d1	d2
Intercept	0.2962962963	-0.296296296	-0.296296296
d1	-0.296296296	0.4740740741	0.2962962963
d2	-0.296296296	0.2962962963	0.5185185185

Reference Cell Coding Dummy Codes
--

X			XTX		
1	0	0	12	5	4
1	0	0	5	5	0
1	0	0	4	0	4
1	1	0			
1	1	0			
1	1	0			
1	1	0			
1	1	0			
1	0	1			
1	0	1			
1	0	1			
1	0	1			

XTXI			XTY	B
0.3333333	-0.3333333	-0.3333333	42	2
-0.3333333	0.5333333	0.3333333	20	2
-0.3333333	0.3333333	0.5833333	16	2

**Cell Mean Coding
Indicator Codes**

The REG Procedure
Model: MODEL1
Dependent Variable: y

```
proc reg data=codes;
model y = i0 i1 i2 / noint
stb tol vif covb pcorr1 scorr1 pcorr2 scorr2;
run;
```

NOTE: No intercept in model. R-Square is redefined.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	156.00000	52.00000	58.50	<.0001
Error	9	8.00000	0.88889		
Uncorrected Total	12	164.00000			

Root MSE	0.94281	R-Square	0.9512
Dependent Mean	3.50000	Adj R-Sq	0.9350
Coeff Var	26.93740		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I
i0	1	2.00000	0.54433	3.67	0.0051	0.27050	0.07317	0.07317
i1	1	4.00000	0.42164	9.49	<.0001	0.69843	0.48780	0.52632
i2	1	4.00000	0.47140	8.49	<.0001	0.62470	0.39024	0.88889

Variable	DF	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
i0	1	0.07317	0.60000	1.00000	1.00000
i1	1	0.48780	0.90909	1.00000	1.00000
i2	1	0.39024	0.88889	1.00000	1.00000

Covariance of Estimates

Variable	i0	i1	i2
i0	0.2962962963	0	0
i1	0	0.1777777778	0
i2	0	0	0.2222222222

Effect Coding

The REG Procedure
 Model: MODEL1
 Dependent Variable: y

```
proc reg data=codes;
model y = e1 e2 /
  stb tol vif covb pcorr1 scorr1 pcorr2 scorr2;
run;
```

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000	4.50000	5.06	0.0336
Error	9	8.00000	0.88889		
Corrected Total	11	17.00000			

Root MSE	0.94281	R-Square	0.5294
Dependent Mean	3.50000	Adj R-Sq	0.4248
Coeff Var	26.93740		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I
Intercept	1	2.00000	0.54433	3.67	0.0051	0	.	.
e1	1	2.00000	0.72008	2.78	0.0215	1.44846	0.00165	0.00165
e2	1	-4.00000	1.25904	-3.18	0.0112	-1.65683	0.52776	0.52863

Variable	DF	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	1	.	.	.	0
e1	1	0.40336	0.46154	0.19226	5.20139
e2	1	0.52776	0.52863	0.19226	5.20139

Covariance of Estimates

Variable	Intercept	e1	e2
Intercept	0.2962962963	-0.296296296	0.5925925926
e1	-0.296296296	0.5185185185	-0.814814815
e2	0.5925925926	-0.814814815	1.5851851852

Effect Coding

X			XTX		
1	0	0	12	-1	-5
1	0	0	-1	9	5
1	0	0	-5	5	5
1	-1	-1			
1	-1	-1			
1	-1	-1			
1	-1	-1			
1	-1	-1			
1	1	0			
1	1	0			
1	1	0			
1	1	0			

XTXI			XTY	B
0.3333333	-0.3333333	0.6666667	42	2
-0.3333333	0.5833333	-0.9166667	-4	2
0.6666667	-0.9166667	1.7833333	-20	-4

**Classical ANOVA Coding
Indicator Codes**

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000	4.50000	5.06	0.0336
Error	9	8.00000	0.88889		
Corrected Total	11	17.00000			

Root MSE	0.94281	R-Square	0.5294
Dependent Mean	3.50000	Adj R-Sq	0.4248
Coeff Var	26.93740		

```
proc reg data=codes;
model y = i0 i1 i2 /
stb tol vif covb pcorr1 scorrl pcorr2 scorrl2;
restrict i0+ i1+ i2 = 0; run;
```

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type II
Intercept	1	3.33333	0.27815	11.98	<.0001	0	.
i0	1	-1.33333	0.41968	-3.18	0.0112	-0.48507	0.52776
i1	1	0.66667	0.36963	1.80	0.1048	0.27614	0.17009
i2	1	0.66667	0.38915	1.71	0.1208	0.26404	0.15345
RESTRICT	-1	-2.8959E-16	1.39474E-8	-0.00	1.0000*	.	.

Variable	DF	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	1	.	.	0
i0	1	0.52863	2.24299	0.44583
i1	1	0.26549	2.23064	0.44830
i2	1	0.24590	2.20109	0.45432
RESTRICT	-1	.	.	.

* Probability computed using beta distribution.

Covariance of Estimates

Variable	Intercept	i0	i1	i2
Intercept	0.0773662551	0.021399177	-0.018106996	-0.003292181
i0	0.021399177	0.1761316872	-0.080658436	-0.095473251
i1	-0.018106996	-0.080658436	0.1366255144	-0.055967078
i2	-0.003292181	-0.095473251	-0.055967078	0.1514403292

Classical ANOVA Coding Indicator Codes

X				XTX			
1	1	0	0	12	3	5	4
1	1	0	0	3	3	0	0
1	1	0	0	5	0	5	0
1	0	1	0	4	0	0	4
1	0	1	0				
1	0	1	0				
1	0	1	0				
1	0	0	1				
1	0	0	1				
1	0	0	1				
1	0	0	1				
1	0	0	1				

XTXI				XTY	B
0.0489583	0.034375	0.0010417	0.0135417	42	2.5
0.034375	0.215625	-0.084375	-0.096875	6	-0.5
0.0010417	-0.084375	0.1489583	-0.063542	20	1.5
0.0135417	-0.096875	-0.063542	0.1739583	16	1.5

Polynomial Coding

The REG Procedure
 Model: MODEL1
 Dependent Variable: y

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000	4.50000	5.06	0.0336
Error	9	8.00000	0.88889		
Corrected Total	11	17.00000			

Root MSE	0.94281	R-Square	0.5294
Dependent Mean	3.50000	Adj R-Sq	0.4248
Coeff Var	26.93740		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I
Intercept	1	2.00000	0.54433	3.67	0.0051	0	.	.
group	1	3.00000	1.19722	2.51	0.0335	1.91357	0.35932	0.35932
group2	1	-1.00000	0.55444	-1.80	0.1048	-1.37734	0.17009	0.26549

Variable	DF	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	1	.	.	.	0
group	1	0.32832	0.41096	0.08966	11.15312
group2	1	0.17009	0.26549	0.08966	11.15312

Covariance of Estimates

Variable	Intercept	group	group2
Intercept	0.2962962963	-0.4444444444	0.1481481481
group	-0.4444444444	1.4333333333	-0.6333333333
group2	0.1481481481	-0.6333333333	0.3074074074

Polynomial Coding

X			XTX		
1	0	0	12	13	21
1	0	0	13	21	37
1	0	0	21	37	69
1	1	1			
1	1	1			
1	1	1			
1	1	1			
1	1	1			
1	2	4			
1	2	4			
1	2	4			
1	2	4			

XTXI			XTY	B
0.3333333	-0.5	0.1666667	42	2
-0.5	1.6125	-0.7125	52	3
0.1666667	-0.7125	0.3458333	84	-1

**Orthogonal Polynomial
Coding (Contrasts)**

The REG Procedure
Model: MODEL1
Dependent Variable: y

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000	4.50000	5.06	0.0336
Error	9	8.00000	0.88889		
Corrected Total	11	17.00000			

Root MSE	0.94281	R-Square	0.5294
Dependent Mean	3.50000	Adj R-Sq	0.4248
Coeff Var	26.93740		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I
Intercept	1	3.33333	0.27815	11.98	<.0001	0	.	.
line	1	1.00000	0.36004	2.78	0.0215	0.63786	0.35932	0.35932
quad	1	0.33333	0.18481	1.80	0.1048	0.41421	0.17009	0.26549

Variable	DF	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	Tolerance	Variance Inflation
Intercept	1	.	.	.	0
line	1	0.40336	0.46154	0.99139	1.00868
quad	1	0.17009	0.26549	0.99139	1.00868

Covariance of Estimates

Variable	Intercept	line	quad
Intercept	0.0773662551	-0.012345679	-0.009053498
line	-0.012345679	0.1296296296	0.0061728395
quad	-0.009053498	0.0061728395	0.0341563786

The GLM Procedure
 Class Level Information
 Class Levels Values
 group 3 0 1 2

Orthogonal Polynomial Coding (Contrasts)

Number of observations 12

Dependent Variable: y

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	9.00000000	4.50000000	5.06	0.0336
Error	9	8.00000000	0.88888889		
Corrected Total	11	17.00000000			

R-Square Coeff Var Root MSE y Mean
 0.529412 26.93740 0.942809 3.500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
group	2	9.00000000	4.50000000	5.06	0.0336

Source	DF	Type III SS	Mean Square	F Value	Pr > F
group	2	9.00000000	4.50000000	5.06	0.0336

Contrast	DF	Contrast SS	Mean Square	F Value	Pr > F
Additive	1	6.85714286	6.85714286	7.71	0.0215
Dominance	1	2.89156627	2.89156627	3.25	0.1048

Level of group	N	-----y----- Mean	Std Dev
0	3	2.00000000	1.00000000
1	5	4.00000000	1.00000000
2	4	4.00000000	0.81649658

Orthogonal Polynomial Coding (Contrasts)

X			XTX		
1	-1	-1	12	1	3
1	-1	-1	1	7	-1
1	-1	-1	3	-1	27
1	0	2			
1	0	2			
1	0	2			
1	0	2			
1	0	2			
1	1	-1			
1	1	-1			
1	1	-1			
1	1	-1			

XTXI			XTY	B
0.087037	-0.013889	-0.010185	42	3.3333333
-0.013889	0.1458333	0.0069444	10	1
-0.010185	0.0069444	0.0384259	18	0.3333333