

```
options nocenter nodate;
data one;
  input yield fert variety $;
  cards;
134 5 A
140 10 A
146 15 A
153 20 A
138 5 B
142 10 B
145 15 B
147 20 B
;
data two; set one;
  y=yield;
  x1=fert;
  if variety='A' then x2=1;
  else x2=0;
  x3=x1*x2;
run;
proc print;
run;
```

Obs	yield	fert	variety	y	x1	x2	x3
1	134	5	A	134	5	1	5
2	140	10	A	140	10	1	10
3	146	15	A	146	15	1	15
4	153	20	A	153	20	1	20
5	138	5	B	138	5	0	0
6	142	10	B	142	10	0	0
7	145	15	B	145	15	0	0
8	147	20	B	147	20	0	0

```
proc reg;
  model y=x1 x2 x3;
run;
```

The REG Procedure
 Dependent Variable: y

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	243.57500	81.19167	249.82	<.0001
Error	4	1.30000	0.32500		
Corrected Total	7	244.87500			

Root MSE	0.57009	R-Square	0.9947
Dependent Mean	143.12500	Adj R-Sq	0.9907
Coeff Var	0.39831		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	135.50000	0.69821	194.07	<.0001
x1	1	0.60000	0.05099	11.77	0.0003
x2	1	-8.00000	0.98742	-8.10	0.0013
x3	1	0.66000	0.07211	9.15	0.0008

```
proc glm;
  model y=x1 x2 x3;
  estimate 'Variety A intercept' intercept 1 x2 1;
  estimate 'Variety A slope' x1 1 x3 1;
  estimate 'Variety B intercept' intercept 1;
  estimate 'Variety B slope' x1 1;
run;
```

The GLM Procedure

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	243.5750000	81.1916667	249.82	<.0001
Error	4	1.3000000	0.3250000		
Corrected Total	7	244.8750000			

R-Square Coeff Var Root MSE y Mean
 0.994691 0.398315 0.570088 143.1250

Source	DF	Type I SS	Mean Square	F Value	Pr > F
x1	1	216.2250000	216.2250000	665.31	<.0001
x2	1	0.1250000	0.1250000	0.38	0.5687
x3	1	27.2250000	27.2250000	83.77	0.0008

Source	DF	Type III SS	Mean Square	F Value	Pr > F
x1	1	45.0000000	45.0000000	138.46	0.0003
x2	1	21.33333333	21.33333333	65.64	0.0013
x3	1	27.22500000	27.22500000	83.77	0.0008

Parameter	Estimate	Standard Error	t Value	Pr > t
Variety A intercept	127.500000	0.69821200	182.61	<.0001
Variety A slope	1.260000	0.05099020	24.71	<.0001
Variety B intercept	135.500000	0.69821200	194.07	<.0001
Variety B slope	0.600000	0.05099020	11.77	0.0003

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	135.5000000	0.69821200	194.07	<.0001
x1	0.6000000	0.05099020	11.77	0.0003
x2	-8.0000000	0.98742088	-8.10	0.0013
x3	0.6600000	0.07211103	9.15	0.0008

```
-----
data three;
  input yield fert variety $;
  cards;
134 5 A
140 10 A
146 15 A
153 20 A
138 5 B
142 10 B
145 15 B
147 20 B
137 5 C
144 10 C
150 15 C
158 20 C
```

```

;
data four; set three;
  y=yield;
  x1=fert;
  if variety='A' then x2=1;
  else x2=0;
  if variety='B' then x3=1;
  else x3=0;
  x4=x1*x2;
  x5=x1*x3;
run;

proc print;
run;

```

Obs	yield	fert	variety	y	x1	x2	x3	x4	x5
1	134	5	A	134	5	1	0	5	0
2	140	10	A	140	10	1	0	10	0
3	146	15	A	146	15	1	0	15	0
4	153	20	A	153	20	1	0	20	0
5	138	5	B	138	5	0	1	0	5
6	142	10	B	142	10	0	1	0	10
7	145	15	B	145	15	0	1	0	15
8	147	20	B	147	20	0	1	0	20
9	137	5	C	137	5	0	0	0	0
10	144	10	C	144	10	0	0	0	0
11	150	15	C	150	15	0	0	0	0
12	158	20	C	158	20	0	0	0	0

```

proc glm;
  model y=x1 x2 x3 x4 x5;
  estimate 'Variety A intercept' intercept 1 x2 1;
  estimate 'Variety A slope' x1 1 x4 1;
  estimate 'Variety B intercept' intercept 1 x3 1;
  estimate 'Variety B slope' x1 1 x5 1;
  estimate 'Variety C intercept' intercept 1;
  estimate 'Variety C slope' x1 1;
run;

```

The GLM Procedure

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	527.0000000	105.4000000	316.20	<.0001
Error	6	2.0000000	0.3333333		
Corrected Total	11	529.0000000			

R-Square Coeff Var Root MSE y Mean
0.996219 0.399550 0.577350 144.5000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OMMITTED					

Source	DF	Type III SS	Mean Square	F Value	Pr > F
OMMITTED					

Parameter	Estimate	Standard Error	t Value	Pr > t
Variety A intercept	127.500000	0.70710678	180.31	<.0001
Variety A slope	1.260000	0.05163978	24.40	<.0001
Variety B intercept	135.500000	0.70710678	191.63	<.0001
Variety B slope	0.600000	0.05163978	11.62	<.0001
Variety C intercept	130.000000	0.70710678	183.85	<.0001
Variety C slope	1.380000	0.05163978	26.72	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	130.000000	0.70710678	183.85	<.0001
x1	1.380000	0.05163978	26.72	<.0001
x2	-2.500000	1.00000000	-2.50	0.0465
x3	5.500000	1.00000000	5.50	0.0015
x4	-0.120000	0.07302967	-1.64	0.1515
x5	-0.780000	0.07302967	-10.68	<.0001

```

proc glm;
  model y=x1 x2 x3 x5;
  estimate 'Variety A intercept' intercept 1 x2 1;
  estimate 'Variety A slope' x1 1;
  estimate 'Variety B intercept' intercept 1 x3 1;
  estimate 'Variety B slope' x1 1 x5 1;
  estimate 'Variety C intercept' intercept 1;
  estimate 'Variety C slope' x1 1;
run;

```

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	526.1000000	131.5250000	317.47	<.0001
Error	7	2.9000000	0.4142857		
Corrected Total	11	529.0000000			

R-Square Coeff Var Root MSE y Mean
0.994518 0.445433 0.643650 144.5000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
OMITTED					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
OMITTED					

Parameter	Estimate	Standard Error	t Value	Pr > t
Variety A intercept	126.750000	0.60207973	210.52	<.0001
Variety A slope	1.320000	0.04070802	32.43	<.0001
Variety B intercept	135.500000	0.78830741	171.89	<.0001
Variety B slope	0.600000	0.05756983	10.42	<.0001
Variety C intercept	130.750000	0.60207973	217.16	<.0001
Variety C slope	1.320000	0.04070802	32.43	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > t
Intercept	130.750000	0.60207973	217.16	<.0001
x1	1.320000	0.04070802	32.43	<.0001
x2	-4.000000	0.45512949	-8.79	<.0001
x3	4.750000	0.99193174	4.79	0.0020
x5	-0.720000	0.07050836	-10.21	<.0001