

```
1 /***** kars.sas *****/
2 title 'Metric Cars Data Example';
3 title2 'Jerry Brunner: Student Number 999999999';
4
5 data auto;
6   infile '/folders/myfolders/431s15/mcars4.data' firstobs=2 ; /* Skipping the header on line 1 */
7   input id country $ lper100k weight length;
8   /* Indicator dummy vars: Ref category is Japanese */
9   if country = 'US' then c1=1;
10  else if country = 'Japan' then c1=0;
11  else if country = 'Europ' then c1=0;
12  if country = 'Europ' then c2=1;
13  else if country = 'US' then c2=0;
14  else if country = 'Japan' then c2=0;
15  /* Product terms for the interactions */
16  wc1 = weight*c1; wc2 = weight*c2;
17  Lc1 = length*c1; Lc2 = length*c2;
18  label country = 'Country of Origin'
19         lper100k = 'Litres per 100 Kilometers'
20         weight = 'Weight in kg'
21         length = 'Length in cm';
22
23 proc freq;
24   title3 'Frequency Distributions';
25   tables country c1 c2 ;
26 proc means;
27   title3 'Means and standard deviations by country';
28   class country;
29   var lper100k weight length;
30
31 proc corr;
32   title3 'Correlation matrix';
33   var lper100k weight length c1 c2;
34
35 ods graphics off; /* Suppress regression plots */
36 proc reg;
37   title3 'Regression model with non-parallel planes';
38   model lper100k = weight length c1 c2 wc1 wc2 Lc1 Lc2;
39   EqualSlopes: test wc1 = wc2 = Lc1 = Lc2 = 0;
40
41 proc reg;
42   title3 'Parallel planes';
43   model lper100k = weight length c1 c2;
44   USvsEURO: test c1=c2; /* US vs European controlling for weight and length */
45   country: test c1 = c2 = 0;
46
```

Metric Cars Data Example
Jerry Brunner: Student Number 99999999
Frequency Distributions

The FREQ Procedure

Country of Origin				
country	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Europ	14	14.00	14	14.00
Japan	13	13.00	27	27.00
US	73	73.00	100	100.00

c1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	27	27.00	27	27.00
1	73	73.00	100	100.00

c2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	86	86.00	86	86.00
1	14	14.00	100	100.00

Metric Cars Data Example
Jerry Brunner: Student Number 999999999
Means and standard deviations by country

The MEANS Procedure

Country of Origin	N Obs	Variable	Label	N	Mean	Std Dev	Minimum	Maximum
Europ	14	lper100k	Litres per 100 Kilometers	14	10.1785714	3.6190051	5.8000000	17.0000000
		weight	Weight in kg	14	1080.07	240.8457739	823.0000000	1539.00
		length	Length in cm	14	4.2942857	0.4406239	3.6100000	4.9000000
Japan	13	lper100k	Litres per 100 Kilometers	13	10.6846154	2.3632062	6.8000000	13.2000000
		weight	Weight in kg	13	1060.00	104.6804662	891.0000000	1237.00
		length	Length in cm	13	4.3407692	0.1804375	3.9100000	4.6700000
US	73	lper100k	Litres per 100 Kilometers	73	12.9643836	3.1325518	7.9000000	19.8000000
		weight	Weight in kg	73	1540.00	327.7703719	949.0000000	2178.00
		length	Length in cm	73	5.0461644	0.4789996	4.1400000	5.9200000

Metric Cars Data Example
Jerry Brunner: Student Number 99999999
Correlation matrix

The CORR Procedure

5 Variables:	lper100k weight length c1 c2
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Simple Statistics							
Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
lper100k	100	12.27800	3.29203	1228	5.80000	19.80000	Litres per 100 Kilometers
weight	100	1413	361.95176	141321	823.00000	2178	Weight in kg
length	100	4.84920	0.54991	484.92000	3.61000	5.92000	Length in cm
c1	100	0.73000	0.44620	73.00000	0	1.00000	
c2	100	0.14000	0.34874	14.00000	0	1.00000	

Pearson Correlation Coefficients, N = 100					
Prob > r under H0: Rho=0					
	lper100k	weight	length	c1	c2
lper100k Litres per 100 Kilometers	1.00000	0.83423 <.0001	0.82141 <.0001	0.34456 0.0004	-0.25860 0.0094
weight Weight in kg	0.83423 <.0001	1.00000	0.94604 <.0001	0.57889 <.0001	-0.37323 0.0001
length Length in cm	0.82141 <.0001	0.94604 <.0001	1.00000	0.59191 <.0001	-0.40919 <.0001
c1	0.34456 0.0004	0.57889 <.0001	0.59191 <.0001	1.00000	-0.66343 <.0001
c2	-0.25860 0.0094	-0.37323 0.0001	-0.40919 <.0001	-0.66343 <.0001	1.00000

Metric Cars Data Example
Jerry Brunner: Student Number 99999999
Regression model with non-parallel planes

The REG Procedure
Model: MODEL1
Dependent Variable: lper100k Litres per 100 Kilometers

Number of Observations Read	100
Number of Observations Used	100

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	817.63884	102.20486	36.43	<.0001
Error	91	255.27276	2.80520		
Corrected Total	99	1072.91160			

Root MSE	1.67487	R-Square	0.7621
Dependent Mean	12.27800	Adj R-Sq	0.7412
Coeff Var	13.64124		

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-10.07335	16.83584	-0.60	0.5511
weight	Weight in kg	1	0.01692	0.01024	1.65	0.1019
length	Length in cm	1	0.64989	5.94151	0.11	0.9131
c1		1	5.01091	17.14931	0.29	0.7708
c2		1	-1.83239	18.58103	-0.10	0.9217
wc1		1	-0.01123	0.01036	-1.08	0.2810
wc2		1	-0.01035	0.01171	-0.88	0.3793
Lc1		1	1.18552	6.03345	0.20	0.8447
Lc2		1	2.83971	6.70494	0.42	0.6729

Metric Cars Data Example
Jerry Brunner: Student Number 999999999
Regression model with non-parallel planes

The REG Procedure
Model: MODEL1

Test EqualSlopes Results for Dependent Variable lper100k				
Source	DF	Mean Square	F Value	Pr > F
Numerator	4	5.08328	1.81	0.1333
Denominator	91	2.80520		

Metric Cars Data Example
Jerry Brunner: Student Number 999999999
Parallel planes

The REG Procedure
Model: MODEL1
Dependent Variable: lper100k Litres per 100 Kilometers

Number of Observations Read	100
Number of Observations Used	100

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	797.30574	199.32644	68.71	<.0001
Error	95	275.60586	2.90111		
Corrected Total	99	1072.91160			

Root MSE	1.70327	R-Square	0.7431
Dependent Mean	12.27800	Adj R-Sq	0.7323
Coeff Var	13.87250		

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-5.28270	2.92605	-1.81	0.0742
weight	Weight in kg	1	0.00546	0.00147	3.71	0.0004
length	Length in cm	1	2.34597	0.98033	2.39	0.0187
c1		1	-1.99424	0.58499	-3.41	0.0010
c2		1	-0.50652	0.66016	-0.77	0.4448

Metric Cars Data Example
Jerry Brunner: Student Number 999999999
Parallel planes

The REG Procedure
Model: MODEL1

Test USvsEURO Results for Dependent Variable lper100k				
Source	DF	Mean Square	F Value	Pr > F
Numerator	1	19.37833	6.68	0.0113
Denominator	95	2.90111		

Metric Cars Data Example
Jerry Brunner: Student Number 999999999
Parallel planes

The REG Procedure
Model: MODEL1

Test country Results for Dependent Variable lper100k				
Source	DF	Mean Square	F Value	Pr > F
Numerator	2	20.01754	6.90	0.0016
Denominator	95	2.90111		

```

1      OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
NOTE: ODS statements in the SAS Studio environment may disable some output features.
43      ;
44      /***** kars.sas *****/
45      title 'Metric Cars Data Example';
46      title2 'Jerry Brunner: Student Number 999999999';
47
48      data auto;
49          infile '/folders/myfolders/431s15/mcars4.data' firstobs=2 ; /* Skipping the header on line 1 */
50          input id country $ lper100k weight length;
51      /* Indicator dummy vars: Ref category is Japanese */
52          if country = 'US' then c1=1;
53          else if country = 'Japan' then c1=0;
54          else if country = 'Europ' then c1=0;
55          if country = 'Europ' then c2=1;
56          else if country = 'US' then c2=0;
57          else if country = 'Japan' then c2=0;
58      /* Product terms for the interactions */
59          wc1 = weight*c1; wc2 = weight*c2;
60          Lc1 = length*c1; Lc2 = length*c2;
61          label country = 'Country of Origin'
62                lper100k = 'Litres per 100 Kilometers'
63                weight = 'Weight in kg'
64                length = 'Length in cm';
65

```

NOTE: The infile '/folders/myfolders/431s15/mcars4.data' is:
 Filename=/folders/myfolders/431s15/mcars4.data,
 Owner Name=root,Group Name=vboxsf,
 Access Permission=-rwxrwx---,
 Last Modified=16Dec2014:10:31:07,
 File Size (bytes)=4160

NOTE: 100 records were read from the infile '/folders/myfolders/431s15/mcars4.data'.
 The minimum record length was 40.
 The maximum record length was 40.

NOTE: The data set WORK.AUTO has 100 observations and 11 variables.

NOTE: DATA statement used (Total process time):
 real time 0.04 seconds
 cpu time 0.03 seconds

```

66      proc freq;
67          title3 'Frequency Distributions';
68          tables country c1 c2 ;

```

NOTE: There were 100 observations read from the data set WORK.AUTO.

NOTE: The PROCEDURE FREQ printed page 1.

NOTE: PROCEDURE FREQ used (Total process time):
 real time 0.14 seconds
 cpu time 0.09 seconds

```

69      proc means;
70          title3 'Means and standard deviations by country';
71          class country;
72          var lper100k weight length;
73

```

NOTE: There were 100 observations read from the data set WORK.AUTO.

NOTE: The PROCEDURE MEANS printed page 2.

NOTE: PROCEDURE MEANS used (Total process time):
 real time 0.09 seconds
 cpu time 0.09 seconds

```

74      proc corr;
75          title3 'Correlation matrix';

```

```
76          var lper100k weight length c1 c2;
77
78          ods graphics off; /* Suppress regression plots */
```

```
NOTE: The PROCEDURE CORR printed page 3.
NOTE: PROCEDURE CORR used (Total process time):
      real time          0.11 seconds
      cpu time           0.11 seconds
```

```
79          proc reg;
80              title3 'Regression model with non-parallel planes';
81              model lper100k = weight length c1 c2 wc1 wc2 Lc1 Lc2;
82              EqualsSlopes: test wc1 = wc2 = Lc1 = Lc2 = 0;
83
```

```
NOTE: The PROCEDURE REG printed pages 4-5.
NOTE: PROCEDURE REG used (Total process time):
      real time          0.23 seconds
      cpu time           0.13 seconds
```

```
84          proc reg;
85              title3 'Parallel planes';
86              model lper100k = weight length c1 c2;
87              USvsEURO: test c1=c2;          /* US vs European controlling for weight and length */
88              country: test c1 = c2 = 0;
89
90              ;
91          OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
101         ;
```