Sep 03, 07 4:51 **x5_6.sas** Page 1/1

```
/* x5_6.sas */
/* Purpose:  */

title1 'Example 5.6. Artificial data.';

data a;
  do diet=1,2,3,4,5;
    do age=20,30,40,50;
      do replicat=1,2,3,4,5;
        wgh= 70 + 2*diet + age/10;
        err= rannor(2495867);
        weight=wgh+err;
        output;
      end;
    end;
  end;
  keep diet age replicat wgh err weight;

proc print data=a;
title2 'List of data - they are constructed to give a dependence of diet and age

proc glm data=a;
  class diet age replicat;
  model weight=diet age diet*age /solution;
  random diet*age /test;
title2 'Analysis using proc glm.';

run;
```

Example 5.6. Artificial data. 1

List of data - they are constructed to give a dependence of diet and age.

Obs	diet	age	replicat	wgh	err	weight
1	1	20	1	74	-0.19472	73.8053
2	1	20	2	74	-1.55947	72.4405
3	1	20	3	74	-0.73817	73.2618
4	1	20	4	74	0.30392	74.3039
5	1	20	5	74	-0.09640	73.9036
6	1	30	1	75	1.11333	76.1133
7	1	30	2	75	0.09632	75.0963
8	1	30	3	75	-1.27153	73.7285
9	1	30	4	75	-0.59252	74.4075
10	1	30	5	75	-1.16048	73.8395
11	1	40	1	76	-0.10977	75.8902
12	1	40	2	76	0.62853	76.6285
13	1	40	3	76	0.47411	76.4741
14	1	40	4	76	-0.21748	75.7825
15	1	40	5	76	0.46292	76.4629
16	1	50	1	77	1.02141	78.0214
17	1	50	2	77	1.43976	78.4398
18	1	50	3	77	-0.24466	76.7553
19	1	50	4	77	-0.34273	76.6573
20	1	50	5	77	0.23634	77.2363
21	2	20	1	76	3.02131	79.0213
22	2	20	2	76	-0.35376	75.6462
23	2	20	3	76	0.98702	76.9870
24	2	20	4	76	-0.15091	75.8491
25	2	20	5	76	1.28152	77.2815
26	2	30	1	77	-0.75122	76.2488
27	2	30	2	77	0.59789	77.5979
28	2	30	3	77	0.78820	77.7882
29	2	30	4	77	0.48182	77.4818
30	2	30	5	77	-0.62640	76.3736
31	2	40	1	78	0.80217	78.8022
32	2	40	2	78	-0.17027	77.8297
33	2	40	3	78	-0.75456	77.2454
34	2	40	4	78	-0.44728	77.5527
35	2	40	5	78	1.71064	79.7106
36	2	50	1	79	1.34249	80.3425
37	2	50	2	79	-1.26667	77.7333
38	2	50	3	79	0.20480	79.2048
39	2	50	4	79	-1.06675	77.9332
40	2	50	5	79	-0.57274	78.4273
41	3	20	1	78	-0.77916	77.2208
42	3	20	2	78	0.43823	78.4382
43	3	20	3	78	-0.87213	77.1279
44	3	20	4	78	-1.19509	76.8049
45	3	20	5	78	0.53205	78.5320
46	3	30	1	79	1.06552	80.0655
47	3	30	2	79	0.86595	79.8660
48	3	30	3	79	0.63394	79.6339
49	3	30	4	79	-0.19369	78.8063
50	3	30	5	79	1.22584	80.2258
51	3	40	1	80	0.63189	80.6319
52	3	40	2	80	-0.24320	79.7568
53	3	40	3	80	0.33572	80.3357
54	3	40	4	80	-0.23596	79.7640
55	3	40	5	80	0.12784	80.1278
56	3	50	1	81	0.86002	81.8600
57	3	50	2	81	-0.14162	80.8584

58	3	50	3	81	-0.62354	80.3765
59	3	50	4	81	1.46962	82.4696
60	3	50	5	81	-0.38526	80.6147

Example 5.6. Artificial data. 2
List of data - they are constructed to give a dependence of diet and age.

Obs	diet	age	replicat	wgh	err	weight
61	4	20	1	80	1.14492	81.1449
62	4	20	2	80	-0.42279	79.5772
63	4	20	3	80	-0.52746	79.4725
64	4	20	4	80	-1.26724	78.7328
65	4	20	5	80	-1.14732	78.8527
66	4	30	1	81	-0.31404	80.6860
67	4	30	2	81	1.49294	82.4929
68	4	30	3	81	-0.29594	80.7041
69	4	30	4	81	-0.00715	80.9929
70	4	30	5	81	-0.91799	80.0820
71	4	40	1	82	-0.81212	81.1879
72	4	40	2	82	-0.15141	81.8486
73	4	40	3	82	-0.24608	81.7539
74	4	40	4	82	-2.33100	79.6690
75	4	40	5	82	-0.42590	81.5741
76	4	50	1	83	-0.68578	82.3142
77	4	50	2	83	-2.21471	80.7853
78	4	50	3	83	-0.64329	82.3567
79	4	50	4	83	-2.33488	80.6651
80	4	50	5	83	-0.23088	82.7691
81	5	20	1	82	-0.41129	81.5887
82	5	20	2	82	1.54263	83.5426
83	5	20	3	82	0.09853	82.0985
84	5	20	4	82	-0.66364	81.3364
85	5	20	5	82	0.28066	82.2807
86	5	30	1	83	0.90290	83.9029
87	5	30	2	83	-1.13192	81.8681
88	5	30	3	83	-0.08621	82.9138
89	5	30	4	83	0.45357	83.4536
90	5	30	5	83	0.69034	83.6903
91	5	40	1	84	-0.42826	83.5717
92	5	40	2	84	-0.48194	83.5181
93	5	40	3	84	-0.20328	83.7967
94	5	40	4	84	1.45243	85.4524
95	5	40	5	84	-0.20338	83.7966
96	5	50	1	85	-0.32059	84.6794
97	5	50	2	85	-0.28688	84.7131
98	5	50	3	85	0.81158	85.8116
99	5	50	4	85	-0.08921	84.9108
100	5	50	5	85	-0.72927	84.2707

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Example 5.6. Artificial data. 3
Analysis using proc glm.

The GLM Procedure

Class Level Information

Class	Levels	Values
diet	5	1 2 3 4 5
age	4	20 30 40 50
replicat	5	1 2 3 4 5

Number of Observations Read 100
Number of Observations Used 100

Example 5.6. Artificial data. 4
Analysis using proc glm.

The GLM Procedure

Dependent Variable: weight

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	19	878.6249277	46.2434172	63.61	<.0001
Error	80	58.1576783	0.7269710		
Corrected Total	99	936.7826060			

R-Square	Coeff Var	Root MSE	weight Mean
0.937918	1.072933	0.852626	79.46682

Source	DF	Type I SS	Mean Square	F Value	Pr > F
diet	4	755.5011775	188.8752944	259.81	<.0001
age	3	110.2044200	36.7348067	50.53	<.0001
diet*age	12	12.9193302	1.0766108	1.48	0.1488

Source	DF	Type III SS	Mean Square	F Value	Pr > F
diet	4	755.5011775	188.8752944	259.81	<.0001
age	3	110.2044200	36.7348067	50.53	<.0001
diet*age	12	12.9193302	1.0766108	1.48	0.1488

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		84.87712382	B	0.38130591	222.60	<.0001
diet	1	-7.45509992	B	0.53924799	-13.82	<.0001
diet	2	-6.14889716	B	0.53924799	-11.40	<.0001
diet	3	-3.64128334	B	0.53924799	-6.75	<.0001
diet	4	-3.09903321	B	0.53924799	-5.75	<.0001
diet	5	0.00000000	B	.	.	.
age	20	-2.70774522	B	0.53924799	-5.02	<.0001
age	30	-1.71138652	B	0.53924799	-3.17	0.0021
age	40	-0.85000883	B	0.53924799	-1.58	0.1189
age	50	0.00000000	B	.	.	.
diet*age	1 20	-1.17124640	B	0.76261182	-1.54	0.1285
diet*age	1 30	-1.07361383	B	0.76261182	-1.41	0.1631
diet*age	1 40	-0.32435220	B	0.76261182	-0.43	0.6717
diet*age	1 50	0.00000000	B	.	.	.
diet*age	2 20	0.93655698	B	0.76261182	1.23	0.2230
diet*age	2 30	0.08121894	B	0.76261182	0.11	0.9155
diet*age	2 40	0.34992174	B	0.76261182	0.46	0.6476
diet*age	2 50	0.00000000	B	.	.	.
diet*age	3 20	-0.90331485	B	0.76261182	-1.18	0.2397
diet*age	3 30	0.19505820	B	0.76261182	0.26	0.7988
diet*age	3 40	-0.26257435	B	0.76261182	-0.34	0.7315
diet*age	3 50	0.00000000	B	.	.	.
diet*age	4 20	0.48567742	B	0.76261182	0.64	0.5260

diet*age	4 30	0.92486129	B	0.76261182	1.21	0.2288
diet*age	4 40	0.27861521	B	0.76261182	0.37	0.7158
diet*age	4 50	0.00000000	B	.	.	.

```
                         Example 5.6. Artificial data.                         5
                            Analysis using proc glm.

                               The GLM Procedure

Dependent Variable: weight

                                                  Standard
    Parameter              Estimate                  Error    t Value    Pr > |t|

    diet*age  5 20       0.00000000 B       .                   .         .
    diet*age  5 30       0.00000000 B       .                   .         .
    diet*age  5 40       0.00000000 B       .                   .         .
    diet*age  5 50       0.00000000 B       .                   .         .

NOTE: The X'X matrix has been found to be singular, and a generalized inverse
      was used to solve the normal equations.  Terms whose estimates are
      followed by the letter 'B' are not uniquely estimable.

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                         Example 5.6. Artificial data.                         6
                            Analysis using proc glm.

                               The GLM Procedure

   Source                    Type III Expected Mean Square

   diet                      Var(Error) + 5 Var(diet*age) + Q(diet)

   age                       Var(Error) + 5 Var(diet*age) + Q(age)

   diet*age                  Var(Error) + 5 Var(diet*age)

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                         Example 5.6. Artificial data.                         7
                            Analysis using proc glm.

                               The GLM Procedure
            Tests of Hypotheses for Mixed Model Analysis of Variance

Dependent Variable: weight

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

 diet                         4      755.501177     188.875294    175.44   <.0001
 age                          3      110.204420      36.734807     34.12   <.0001

 Error: MS(diet*age)         12       12.919330       1.076611


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

 diet*age                    12       12.919330       1.076611      1.48   0.1488

 Error: MS(Error)            80       58.157678       0.726971
```