Written examination, date: 10. December 2018 *Page 1 of 18 pages* *Enclosure: 12 pages*
Course name: Multivariate Statistics
Course number: 02409
Aids allowed: All
Exam duration: 4 hours
Weighting: The questions are given equal weight

This exam is answered by:

______________________________ ______________________________ ____________
(name) (signature) (study no.)

There is a total of 30 questions for the 6 problems. The answers to the 30 questions must be written into the table below.

Problem	1	1	1	1	1	1	2	2	2	3
Question	1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	3.1
Answer										

Problem	3	3	3	3	3	4	4	4	4	4
Question	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	4.5
Answer										

Problem	5	5	5	5	5	5	5	6	6	6
Question	5.1	5.2	5.3	5.4	5.5	5.6	5.7	6.1	6.2	6.3
Answer										

The possible answers for each question are numbered from 1 to 6. If you enter a wrong number, you may correct it by crossing the wrong number in the table and writing the correct answer immediately below. If there is any doubt about the meaning of a correction then the question will be considered not answered.

Only the front page must be returned. The front page must be returned even if you do not answer any of the questions or if you leave the exam prematurely. Drafts and/or comments are not considered, only the numbers entered above are registered.

A correct answer gives 5 points, a wrong answer gives – 1 point. Unanswered questions or a 6 (corresponding to "don't know") give 0 points. The total number of points needed for a satisfactorily answered exam is determined at the final evaluation of the exam. Especially note that the grade 10 may be given even if only one answer is wrong or unanswered.
Remember to write your name, signature, and study number on the front page.

Remember to write your name, signature, and study number on the front page.

Please note, that there is one and only one correct answer to each question. Furthermore, some of the possible alternative answers may not make sense. When the text refers to SAS-output, the values may be rounded to fewer decimal places than in the output itself. The enclosures do not necessarily contain all the output generated by the given SAS programs. Please check that all pages of the exam paper and the enclosures are present.

Problem 1.

You are encouraged to use statistical software to solve this problem.

In the table below (source: http://www.statistikbanken.dk) we present some data related to hospital treatment for the five Danish regions that are responsible for healthcare. More specifically we give corresponding values of

1. No. of ambulant (outpatient) treatments (pr. 1000 capita)
2. No. of hospital admissions (pr. 1000 capita)
3. No. of bed days (pr. 1000 capita)
4. Fraction of population aged 65 or older
5. Sex

Region	Ambulant treatments (pr. 1000 capita)	Admissions (pr. 1000 capita)	Bed days (pr. 1000 capita)	Fraction of population aged 65 or older	Sex 1=male, 0 = female
RegionH	1077	216	667	0.15080411	1
RegionS	1142	282	790	0.205731552	1
RegionSyd	1447	190	615	0.192755409	1
RegionM	1072	192	559	0.173395829	1
RegionN	1069	177	628	0.195063255	1
RegionH	1490	248	703	0.18459817	0
RegionS	1395	294	770	0.23579325	0
RegionSyd	1859	204	604	0.222110388	0
RegionM	1459	208	549	0.198799601	0
RegionN	1449	194	629	0.224970663	0

We are interested in the differences between the regions. First we consider the model

$$[Ambulant \quad Admission \quad Bed\ days] = \mu + region_i + sex_j \quad , i = 1 \dots 5, \;\; j = 1, 2$$

Question 1.1.

The usual test-statistic for no region effect has – under the null-hypothesis – the following distribution:

1 ☐ $U(4,4,4)$

2 ☐ $U(3,1,4)$

3 ☐ $U(4,1,4)$

4 ☐ $U(3,1,5)$

5 ☐ $U(3,4,4)$

6 ☐ Don't know.

Question 1.2.

The usual test-statistic for no sex effect is:

1 ☐ 117.14

2 ☐ 0.0000004

3 ☐ 2.9362513

4 ☐ 0.00210619

5 ☐ 0.011111

6 ☐ Don't know.

Question 1.3.

We now consider a Linear Discriminant Analysis on the variables $[Ambulant \quad Admissions \quad Bed\ days]$ and want do distinguish between the regions. Note, that Sex is now just considered as a replicate, i.e. we have two observations for each region. The usual test statistic for mean difference between RegionH and RegionS is:

1 ☐ 264.23327

2 ☐ 396.3499

3 ☐ 1321.16635

4 ☐ 17.87025

5 ☐ -1269 +1603

6 ☐ Don't know.

We now investigate how Age, ambulant treatments, and the sex affect admissions and bed days with the following model

$$[Admissions \quad Bed\ days] = [Age65 \quad Ambulant \quad Sex]\begin{bmatrix}\theta_{1,1} & \theta_{1,2}\\ \theta_{2,1} & \theta_{2,2}\\ \theta_{3,1} & \theta_{3,2}\end{bmatrix}$$

We test whether ambulant treatments and sex have any effect

$$\begin{bmatrix}\theta_{2,1} & \theta_{2,2}\\ \theta_{3,1} & \theta_{3,2}\end{bmatrix} = \begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$$

with the following model

$$\mathrm{H}_0\text{: } \boldsymbol{A}\begin{bmatrix}\theta_{1,1} & \theta_{1,2}\\ \theta_{2,1} & \theta_{2,2}\\ \theta_{3,1} & \theta_{3,2}\end{bmatrix}\boldsymbol{B}^T = \boldsymbol{C} \quad \text{vs.} \quad \mathrm{H}_1\text{: } \boldsymbol{A}\begin{bmatrix}\theta_{1,1} & \theta_{1,2}\\ \theta_{2,1} & \theta_{2,2}\\ \theta_{3,1} & \theta_{3,2}\end{bmatrix}\boldsymbol{B}^T \neq \boldsymbol{C}$$

Question 1.4.

In the above model A is equal to:

1 ☐ $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

2 ☐ $\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$

3 ☐ $\begin{bmatrix}0 & 0\\ 1 & 0\\ 0 & 1\end{bmatrix}$

4 ☐ $\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 0\end{bmatrix}$

5 ☐ $\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$

6 ☐ Don’t know.

Question 1.5.

The usual test-statistic for the above model has – under the null-hypothesis – the following distribution:

1 ☐ $U(2,3,7)$

2 ☐ $U(2,2,7)$

3 ☐ $U(2,3,2)$

4 ☐ $U(2,2,10)$

5 ☐ $U(3,2,7)$

6 ☐ Don’t know.

Question 1.6.

The H matrix in the usual test statistic is: (hint: use the option '**INVERSE**' in the PROC GLM model statement to get $(X^TX)^{-1}$)

1 ☐ $\begin{bmatrix} 823.3 & 4399.1 \\ 4399.1 & 26899.7 \end{bmatrix}$

2 ☐ $\begin{bmatrix} -0.018493 & -0.007221 \\ 13.028129 & 95.409017 \end{bmatrix}$

3 ☐ $\begin{bmatrix} 149.48817279 & -0.020476971 \\ -0.020476971 & 0.00002889 \end{bmatrix}$

4 ☐ $\begin{bmatrix} 262973.86 & 745679.78 \\ 745679.78 & 2115132.5 \end{bmatrix}$

5 ☐ $\begin{bmatrix} 428032.64 & 460131.16 \\ 460131.16 & 511154.33 \end{bmatrix}$

6 ☐ Don't know.

Problem 2.

We consider a three-dimensional normally distributed random variable with mean

$$\mathrm{E}\left(\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}\right) = \begin{bmatrix} \mu_x \\ \mu_y \\ \mu_z \end{bmatrix}$$

And dispersion

$$\mathrm{D}\left(\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}\right) = \begin{bmatrix} 1 & \rho & \varphi \\ \rho & 1 & \rho \\ \varphi & \rho & 1 \end{bmatrix}$$

Question 2.1.

What is the expectation of Y given $\begin{bmatrix} X \\ Z \end{bmatrix} = \begin{bmatrix} x \\ z \end{bmatrix}$

1 ☐ $\mu_y + [\rho \quad \varphi] \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}^{-1} \begin{bmatrix} x - \mu_x \\ z - \mu_z \end{bmatrix}$

2 ☐ $\mu_y + [\rho \quad \rho] \begin{bmatrix} 1 & \varphi \\ \varphi & 1 \end{bmatrix}^{-1} \begin{bmatrix} x - \mu_x \\ z - \mu_z \end{bmatrix}$

3 ☐ μ_y

4 ☐ $\mu_y + [\rho \quad \varphi] \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \begin{bmatrix} \mu_x \\ \mu_z \end{bmatrix}$

5 ☐ $\mu_y - \mu_x \mu_z$

6 ☐ Don't know.

Question 2.2.

What is the dispersion of $\begin{bmatrix} X \\ Y \end{bmatrix}$ given Z=z

1 ☐ $\begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}$

2 ☐ $\begin{bmatrix} 1 & \varphi \\ \varphi & 1 \end{bmatrix}$

3 ☐ $\begin{bmatrix} 1-\varphi^2 & \rho-\rho\varphi \\ \rho-\rho\varphi & 1-\rho^2 \end{bmatrix}$

4 ☐ $\begin{bmatrix} \rho\varphi & \rho\varphi \\ \rho\varphi & \rho\varphi \end{bmatrix}$

5 ☐ $\begin{bmatrix} 1-\rho\varphi & \rho-\rho^2\varphi \\ \rho-\rho^2\varphi & 1-\rho\varphi \end{bmatrix}$

6 ☐ Don’t know.

Question 2.3.

What is the squared maximum correlation of Y with a linear combination of X and Z

1 ☐ $1-\frac{2\varphi\rho^2 \ -\varphi^2+1}{1-\varphi^2}$

2 ☐ $1-\frac{2\varphi\rho^2-2\rho^2-\varphi^2+1}{1-\rho^2}$

3 ☐ $1-\frac{1}{1-\varphi^2}$

4 ☐ $\frac{2\varphi\rho^2-2\rho^2-\varphi^2+1}{1-\varphi^2}$

5 ☐ $1-\frac{2\varphi\rho^2-2\rho^2-\varphi^2+1}{1-\varphi^2}$

6 ☐ Don’t know.

Problem 3.

Enclosure A with SAS program and SAS output belongs to this problem. The data was compiled in order to investigate the use of different ingredients in three types of baking goods: cookies, pastries, and pizzas. For the three types, the use of 133 different ingredients was recorded. In total, 1931 recipes were investigated.

Background: The difference between cookies, pastries and pizza can lead to heated debates. Reddit user *u/everest4ever* compiled the following dataset by scraping http://www.foodnetwork.com/ to win an argument relating to a cookie competition in his office, where his cookies were beaten by the egg tarts of a colleague. His analysis showed that based on these data, egg tarts cannot be classified as cookies, and that the colleague should thus be disqualified. The reddit post can be found here:
https://www.reddit.com/r/dataisbeautiful/comments/7ke5a6/the_christmas_cookie_competition_at_my_office/

However, the background information is not relevant for the problem at hand.

Question 3.1.

Based on the plot of the first 2 canonical discriminant functions we can conclude:

1 ☐ The data are perfectly separable using quadratic discriminant analysis

2 ☐ We should use more than 2 canonical discriminant functions before we can conclude

3 ☐ The data has discriminative value, but a linear method will not give a perfect separation

4 ☐ We should perform PCA first, to get better performance

5 ☐ We cannot conclude anything on this basis

6 ☐ Don't know.

Question 3.2.

We now want to classify between cookies and pizzas using only 4 variables. Based on the listed canonical coefficients from the canonical discriminant function, which should we choose?

1 ☐ Yeast, sugar, dough, cheese

2 ☐ Puffpastry, Yeast, sugar, dough

3 ☐ Puffpastry, sugar, water, cookies

4 ☐ Yeast, sugar, dough, oil

5 ☐ Sugar, leaves, cookies, spinach,

6 ☐ Don't know.

We now consider the Linear Discriminant Function for classifying between cookies and pastries using only the following subset of the variables: puffpastry water apples.

Question 3.3.

First we test whether there is a difference in mean value given these three variables. The usual test-statistic for this has – under the null-hypothesis – the following distribution.

1 ☐ $t(1487)$

2 ☐ $F(133{,}1357)$

3 ☐ $t(1357)$

4 ☐ $F(3{,}1487)$

5 ☐ $F(4{,}1486)$

6 ☐ Don't know.

Question 3.4.

What is the misclassification rate?

1 ☐ 0.0809

2 ☐ 0.2432

3 ☐ 279+65

4 ☐ $\frac{279+65}{1017}$

5 ☐ 0.4055

6 ☐ Don't know.

Question 3.5.

A new recipe needs to be classified. In the ingredient list we find $[puffpastry\ water\ apples] = [1\ 0\ 0]$, i.e. puffpastry, but not apples or water. The corresponding discriminant functions are:

1 ☐ $S_{cookies}$: 0.0989 $<$ $S_{pastries}$: 2.6348

2 ☐ $S_{cookies}$: 0.6899 $<$ $S_{pastries}$: 7.6766

3 ☐ $S_{cookies}$: 0.6899 $<$ $S_{pastries}$: 7.6766

4 ☐ $S_{cookies}$: $0.0989 + \log\frac{1}{2} <$ $S_{pastries}$: 2.6348

5 ☐ $S_{cookies}$: 0.7141 $<$ $S_{pastries}$: 5.3057

6 ☐ Don't know.

Question 3.6.

We consider the Linear Discriminant Function for classifying between cookies and pastries using the subset of the variables: puffpastry water apples. We classify as cookies if the function is positive. Using equal priors but a loss of one for cookies and ten for classifying pastry wrong we get:

1 ☐ $[puffpastry\ water\ apples]\begin{bmatrix} 3.5900 \\ -2.0558 \\ -2.3951 \end{bmatrix} + 1.0541 \geq 0$

2 ☐ $[puffpastry\ water\ apples]\begin{bmatrix} 3.5900 \\ 2.0558 \\ 2.3951 \end{bmatrix} + 1.2485 \geq 0$

3 ☐ $[puffpastry\ water\ apples]\begin{bmatrix} -3.5900 \\ -2.0558 \\ -2.3951 \end{bmatrix} - 1.2485 \geq 0$

4 ☐ $[puffpastry\ water\ apples]\begin{bmatrix} -3.5900 \\ -2.0558 \\ -2.3951 \end{bmatrix} + 1.0541 \geq 0$

5 ☐ $[puffpastry\ water\ apples]\begin{bmatrix} 3.5900 \\ 2.0558 \\ 2.3951 \end{bmatrix} - 1.0541 \geq 0$

6 ☐ Don't know.

Problem 4.

Enclosure B with SAS program and SAS output belongs to this problem. We consider data giving the rates (pr. 1000 capita) of different types of crimes and the prevalence of different types of unemployment benefits and social security (pr. 1000 capita) for the 98 municipalities (kommuner) in Denmark (Source http://www.statistikbanken.dk)

We consider the following variables for crime

SAS-name	Meaning
C2	Sexual crimes
C19	Murder
C21	Simple violence
C22	Serious violence
C23	Especially serious violence
C30	Threats
C53	Robbery
C55	Vandalism
C64	Sale of narcotics
C74	Weapon possession

And for social security and benefits

SAS-name	Meaning
S1	Educational benefits (SU)
S3	Unemployment benefit
S4	Social security
S19	Flexjob (state supported jobs)
S33	Integration benefits
S36	Sickness benefit

We shall now investigate the relations between the crime rates and the social benefits by means of a Canonical Correlation Analysis.

Question 4.1.

The first canonical correlation describes which fraction of the variation between V1 and W1

1 ☐ 0.731925

2 ☐ 0.677512

3 ☐ 0.18137

4 ☐ 0.5098

5 ☐ 0.535714

6 ☐ Don’t know.

Question 4.2.

How many canonical correlations are significant at the 5% level?

1 ☐ 1

2 ☐ 2

3 ☐ 3

4 ☐ 4

5 ☐ 5

6 ☐ Don't know.

Question 4.3.

The third canonical variate V3 can be interpreted as

1 ☐ Mainly robbery, but a weighted average of everything, except sexual crimes, murder, and especially serious violence

2 ☐ An average of weapons possession and simple violence

3 ☐ A contrast between sales of narcotics against threats and vandalism

4 ☐ A contrast between murder and vandalism against especially serious violence

5 ☐ A contrast between threats and weapon possession against simple violence

6 ☐ Don't know.

Question 4.4.

From the relation between V1 and W1, we see a clear link between robberies and the number of people on educational benefits. One may speculate on whether students that have run out of money, may be tempted to commit a robbery, or whether an underlying socioeconomic factor is the reason for this. We investigate this further. What is the correlation between C53 (robberies) and S1 (educational benefits - SU) when we condition on S3 (unemployment benefit)?

1 ☐ 0.60196

2 ☐ 0.52351

3 ☐ 0.2896

4 ☐ 0.4236

5 ☐ 0.8804

6 ☐ Don't know.

Question 4.5.

The 95% confidence interval for the correlation between C53 (robberies) and S1 (educational benefits - SU) is:

1 ☐ [0.4583, 0.7150]

2 ☐ [0, 1]

3 ☐ [0.5936, 0.7988]

4 ☐ [0.4951, 0.8973]

5 ☐ [0.4009, 0.8031]

6 ☐ Don’t know.

Problem 5.

Enclosure C with SAS program and SAS output belongs to this problem. The data are corresponding values of 5 different indicators for quality of life. The indicators are presented below. The score values are based on 42500 questionnaires, and the observations considered here are the average score values for 7 different income groups, also given below. The score 0 means 'not satisfied at all', and 10 means 'perfectly satisfied'. Data is from http://www.statistikbanken.dk

The variables are

SAS-name	Meaning
life	Overall satisfaction with life
econ	Satisfaction with economical situation
familiy	Satisfaction with family life
social	Satisfaction with social relations
work	Satisfaction with work

The observations are from the following income groups

Observation	Income group (DKK)
1	0-99.999
2	100.000-199.999
3	200.000-299.999
4	300.000-399.999
5	400.000-499.999
6	500.000-599.999
7	600.000 +

We consider the relation between overall satisfaction with life as dependent variable and the satisfaction with personal economy, family life, social relations and work as the explanatory (independent) variables

We consider two models.

- M1 with all variables, and
- M2 which is the resulting model, after we have reduced the number of explanatory variables by stepwise model selection.

Question 5.1.

What is the usual test statistic for M2 vs M1

1 ☐ 24.26

2 ☐ $\frac{(0.02170-0.01067)/(4-2)}{0.01067/2}$

3 ☐ 46.71

4 ☐ $\frac{(0.25343-0.12947)/(4-2)}{0.01067/2}$

5 ☐ $\frac{(0.02170-0.01067)/4}{0.01067/6}$

6 ☐ Don’t know.

Question 5.2.

The usual test-statistic for M2 vs M1 has – under the null-hypothesis – the following distribution

1 ☐ t(2)

2 ☐ F(2,2)

3 ☐ F(2,4)

4 ☐ t(7-2)

5 ☐ F(2,6)

6 ☐ Don’t know.

Question 5.3.

What is the reduction in the fraction of variance described when moving from model M1 to M2

1 ☐ 0.02170 - 0.01067

2 ☐ 0.0054

3 ☐ 0.51790 - 0.50687

4 ☐ 0.0209

5 ☐ 0.0414

6 ☐ Don’t know.

We now only consider model M2

Question 5.4.

What is the leverage of observation 1

1 ☐ 0.5288

2 ☐ 7.3

3 ☐ 0.172

4 ☐ 0.0536

5 ☐ 3.4840

6 ☐ Don’t know.

Question 5.5.

What is the 95% confidence interval for expected value of observation 7

1 ☐ $[8.07,\ 8.21]$

2 ☐ $[7.96,\ 8.33]$

3 ☐ $[8.13,\ 8.27]$

4 ☐ $[8.03,\ 8.37]$

5 ☐ $[5.63,\ 10.77]$

6 ☐ Don’t know.

Question 5.6.

What is the 95% prediction interval for observation 7

1 ☐ $[7.14,\ 9.14]$

2 ☐ $[5.42,\ 10.98]$

3 ☐ $[8.04,\ 8.24]$

4 ☐ $[7.87,\ 8.42]$

5 ☐ $[5.36,\ 10.92]$

6 ☐ Don’t know.

Question 5.7.

What is the 95% confidence interval for the econ parameter

1 ☐ $[0.092,\ 0.293]$

2 ☐ $[0.007,\ 0.378]$

3 ☐ $[0.084,\ 0.301]$

4 ☐ $[0.154,\ 0.233]$

5 ☐ $[-2.586,\ 2.971]$

6 ☐ Don’t know.

Problem 6.

Enclosure D with SAS program and SAS output belongs to this problem. We again consider the data from problem 4, but now only consider the crime variables.

We consider the following variables for crime

SAS-name	Meaning
C2	Sexual crimes
C19	Murder
C21	Simple violence
C22	Serious violence
C23	Especially serious violence
C30	Threats
C53	Robbery
C55	Vandalism
C64	Sale of narcotics
C74	Weapon possession

We seek to investigate the underlying patterns in crime by running a principal component analysis on all crime variables.

Question 6.1.

How many factors do we need to account for 90 % of the variance

1 ☐ 1

2 ☐ 2

3 ☐ 3

4 ☐ 4

5 ☐ 5

6 ☐ Don’t know.

Question 6.2.

The usual test statistic for the last 4 eigenvalues being equal is

1 ☐ 638

2 ☐ 577

3 ☐ 691.5

4 ☐ 165.3

5 ☐ 7.0569

6 ☐ Don’t know.

Question 6.3.

From the score plots we see at least four clear outliers: observation 36 (Guldborgsund), 39 (Lolland), 59 (Fanø), and 75 (Samsø). Out of these, find the two where problems with vandalism (C55) are *lowest*.

1 ☐ (Fanø, Guldborgsund)

2 ☐ (Fanø, Samsø)

3 ☐ (Samsø, Lolland)

4 ☐ (Guldborgsund, Lolland)

5 ☐ (Samsø, Guldborgsund)

6 ☐ Don't know.

LAST PAGE:
END OF THE EXAM SET

SAS-PROGRAM

```
proc candisc data=home.food out=outcan;
class type;
run;

proc sgplot data=outcan;
scatter x=can1 y=can2 / group=type;
run;

data food2;
set home.food;
if type='Pizzas' then delete;
run;

proc discrim data=food2;
class type;
var puffpastry water apples;
run;
```

Some SAS-outputs have been omitted or truncated

The CANDISC Procedure

Total Sample Size	1931	**DF Total**	1930
Variables	133	**DF Within Classes**	1928
Classes	3	**DF Between Classes**	2

Number of Observations Read	1931
Number of Observations Used	1931

Class Level Information

type	Variable Name	Frequency	Weight	Proportion
Cookies	Cookies	803	803.0000	0.415847
Pastries	Pastries	688	688.0000	0.356292
Pizzas	Pizzas	440	440.0000	0.227861

The CANDISC Procedure

Multivariate Statistics and F Approximations

S=2 M=65 N=897

Statistic	Value	F Value	Num DF	Den DF	Pr > F
NOTE: F Statistic for Roy's Greatest Root is an upper bound.					
NOTE: F Statistic for Wilks' Lambda is exact.					
Wilks' Lambda	0.07175592	36.91	266	3592	<.0001
Pillai's Trace	1.42467016	33.46	266	3594	<.0001
Hotelling-Lawley Trace	6.01787226	40.61	266	3533.4	<.0001
Roy's Greatest Root	4.47024973	60.40	133	1797	<.0001

The CANDISC Procedure

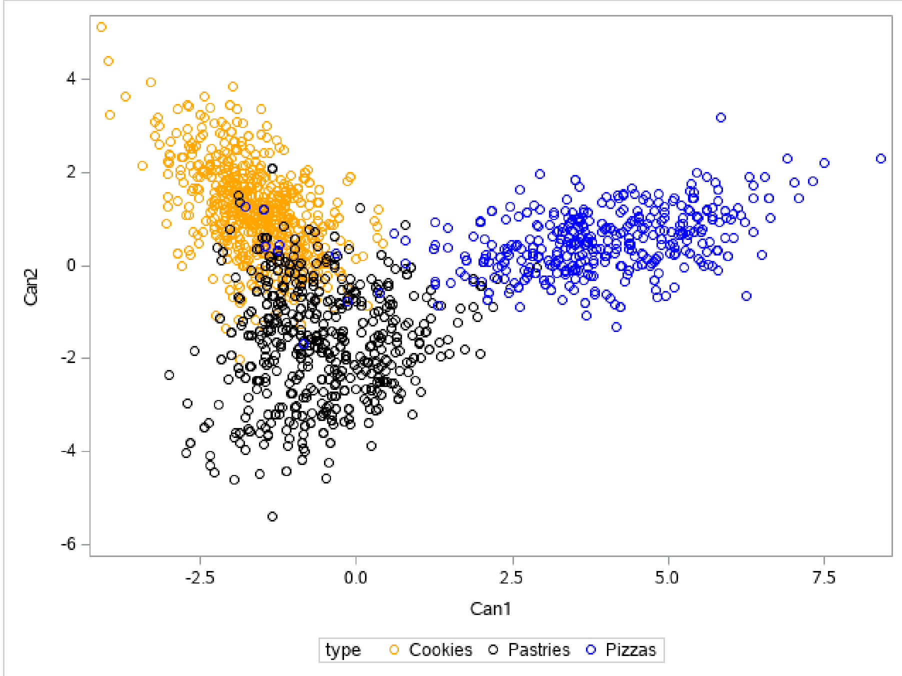
					Eigenvalues of Inv(E)*H = CanRsq/(1-CanRsq)				Test of H0: The canonical correlations in the current row and all that follow are zero				
	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error	Squared Canonical Correlation	Eigenvalue	Difference	Proportion	Cumulative	Likelihood Ratio	Approximate F Value	Num DF	Den DF	Pr > F
1	0.904	0.897	0.0042	0.8172	4.4702	2.9226	0.7428	0.7428	0.07176	36.91	266	3592	<.0001
2	0.779	0.763	0.0089	0.6075	1.5476		0.2572	1.0000	0.39252	21.07	132	1797	<.0001

Standardized Canonical coefficients

Variable	Can1
sugar	-0.39475
leaves	-0.2709
cookies	-0.23706
spinach	-0.22616
eggs	-0.21292
butter	-0.21007
ketchup	-0.17146
cookiedough	-0.15533
ginger	-0.14748
coconut	-0.14254
....	....
sausage	0.126159
mayonnaise	0.131727
tomatoes	0.131727
salt	0.132274
basil	0.172087
garlic	0.18226
oil	0.224803
cheese	0.284828
dough	0.356623
yeast	0.486825

Variable	Can2
puffpastry	-0.51105
water	-0.35857
apples	-0.24084
cinnamon	-0.23036
eggs	-0.2104
strawberries	-0.20549
buttermilk	-0.20135
leaves	-0.17837
butter	-0.1694
milk	-0.15771
...	...
wafercookies	0.113256
yeast	0.127602
chocolate	0.138788
rum	0.156337
peanutbutter	0.165609
foodcoloring	0.176878
coconut	0.18663
molasses	0.227093
cookies	0.287554
bakingsoda	0.303238

Enclosure A



The DISCRIM Procedure

Total Sample Size	1491	DF Total	1490
Variables	3	DF Within Classes	1489
Classes	2	DF Between Classes	1

Number of Observations Read	1491
Number of Observations Used	1491

Class Level Information					
type	Variable Name	Frequency	Weight	Proportion	Prior Probability
Cookies	Cookies	803	803.0000	0.538565	0.500000
Pastries	Pastries	688	688.0000	0.461435	0.500000

Pooled Covariance Matrix Information	
Covariance Matrix Rank	Natural Log of the Determinant of the Covariance Matrix
3	-7.59720

The DISCRIM Procedure

Generalized Squared Distance to type		
From type	Cookies	Pastries
Cookies	0	1.77536
Pastries	1.77536	0

Linear Discriminant Function for type		
Variable	Cookies	Pastries
Constant	-0.02490	-1.07899
puffpastry	0.12381	3.71377
water	0.61521	2.67097
apples	-0.02424	2.37082

The DISCRIM Procedure
Classification Summary for Calibration Data: WORK.FOOD2
Resubstitution Summary using Linear Discriminant Function

Number of Observations and Percent Classified into type			
From type	Cookies	Pastries	Total
Cookies	738 91.91	65 8.09	803 100.00
Pastries	279 40.55	409 59.45	688 100.00
Total	1017 68.21	474 31.79	1491 100.00
Priors	0.5	0.5	

Error Count Estimates for type			
	Cookies	Pastries	Total
Rate	0.0809	0.4055	0.2432
Priors	0.5000	0.5000	

SAS-PROGRAM

```
proc print data=home.socialcrime(obs=10);
var C2 C19 C21 C22 C23 C30 C53 C55 C64 C74 S1 S3 S4 S19 S33 S36;
run;

proc corr data=home.socialcrime;
var C2 C19 C21 C22 C23 C30 C53 C55 C64 C74 S1 S3 S4 S19 S33 S36;
run;

proc cancorr data=home.socialcrime;
var C2 C19 C21 C22 C23 C30 C53 C55 C64 C74;
with S1 S3 S4 S19 S33 S36;
run;
```

Some SAS-outputs have been omitted or truncated

Obs	C2	C19	C21	C22	C23	C30	C53	C55	C64	C74	S1	S3	S4	S19	S33	S36
1	0.269	0	0.776	0.200	.003	0.268	0.231	0.972	0.125	0.705	106.772	17.158	2.843	3.536	0.731	7.469
2	0.105	0	0.268	0.077	.000	0.220	0.191	0.813	0.019	0.268	84.990	13.792	3.405	3.950	0.631	5.012
3	0.141	0	0.492	0.070	.000	0.000	0.000	0.703	0.000	0.141	27.985	8.227	1.898	6.750	1.266	7.594
4	0.604	0	0.511	0.116	.000	0.395	0.116	0.860	0.116	0.813	35.681	11.731	2.300	8.827	0.743	10.244
5	0.216	0	0.866	0.036	.000	0.469	0.036	1.407	0.036	1.082	66.566	14.901	7.721	10.282	0.180	10.679
6	0.186	0	0.331	0.083	.000	0.290	0.083	0.786	0.041	0.662	44.519	10.742	2.773	8.155	0.269	10.017
7	0.197	0	0.563	0.028	.000	0.338	0.113	0.788	0.141	0.788	46.414	16.494	8.022	8.923	0.450	8.838
8	0.304	0	0.317	0.040	.000	0.132	0.132	0.859	0.000	0.238	43.967	9.393	1.968	4.188	0.661	5.469
9	0.115	0	0.446	0.058	.000	0.230	0.014	1.123	0.014	0.605	60.970	11.678	3.557	7.690	0.360	6.682
10	0.133	0	0.531	0.089	.000	0.531	0.089	0.841	0.000	0.841	43.378	12.084	4.913	8.100	0.221	9.207

The CORR Procedure

16 Variables:	C2 C19 C21 C22 C23 C30 C53 C55 C64 C74 S1 S3 S4 S19 S33 S36

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
C2	98	0.19174	0.10646	18.79100	0	0.60400
C19	98	0.00169	0.00694	0.16600	0	0.05100
C21	98	0.41662	0.22047	40.82900	0	1.46200
C22	98	0.06415	0.04822	6.28700	0	0.20300
C23	98	0.0001735	0.00144	0.01700	0	0.01400
C30	98	0.21267	0.13771	20.84200	0	0.71600
C53	98	0.04356	0.04561	4.26900	0	0.23100
C55	98	0.85264	0.35810	83.55900	0	2.58500
C64	98	0.02941	0.04109	2.88200	0	0.21100
C74	98	0.57427	0.23544	56.27800	0	1.33600
S1	98	40.42863	18.35365	3962	7.19400	124.81700
S3	98	9.74143	2.42906	954.66000	6.17600	19.35100
S4	98	3.14888	1.51725	308.59000	0.87100	8.48000
S19	98	12.89147	4.44088	1263	3.53600	22.17400
S33	98	0.97374	0.46030	95.42700	0	3.51000
S36	98	9.08870	1.38977	890.69300	5.01200	11.91900

Pearson Correlation Coefficients, N = 98
Prob > |r| under H0: Rho=0

	C30	C53	C55	C64	C74	S1	S3	S4	S19
C30	1.00000	0.20963 0.0383	0.47538 <.0001	0.25739 0.0105	0.56472 <.0001	0.20518 0.0427	0.35627 0.0003	0.36762 0.0002	-0.16046 0.1145
C53	0.20963 0.0383	1.00000	0.12527 0.2191	0.25453 0.0114	0.14945 0.1419	0.60196 <.0001	0.52351 <.0001	0.12200 0.2314	-0.46599 <.0001
C55	0.47538 <.0001	0.12527 0.2191	1.00000	0.03292 0.7476	0.49922 <.0001	0.28869 0.0039	0.31332 0.0017	0.35685 0.0003	-0.12522 0.2192
C64	0.25739 0.0105	0.25453 0.0114	0.03292 0.7476	1.00000	0.34919 0.0004	0.18612 0.0665	0.35005 0.0004	0.15702 0.1226	0.01024 0.9203
C74	0.56472 <.0001	0.14945 0.1419	0.49922 <.0001	0.34919 0.0004	1.00000	0.11838 0.2457	0.39405 <.0001	0.46745 <.0001	0.04334 0.6718
S1	0.20518 0.0427	0.60196 <.0001	0.28869 0.0039	0.18612 0.0665	0.11838 0.2457	1.00000	0.59661 <.0001	0.13060 0.1999	-0.39665 <.0001
S3	0.35627 0.0003	0.52351 <.0001	0.31332 0.0017	0.35005 0.0004	0.39405 <.0001	0.59661 <.0001	1.00000	0.62057 <.0001	-0.39160 <.0001
S4	0.36762 0.0002	0.12200 0.2314	0.35685 0.0003	0.15702 0.1226	0.46745 <.0001	0.13060 0.1999	0.62057 <.0001	1.00000	-0.06745 0.5093
S19	-0.16046 0.1145	-0.46599 <.0001	-0.12522 0.2192	0.01024 0.9203	0.04334 0.6718	-0.39665 <.0001	-0.39160 <.0001	-0.06745 0.5093	1.00000

The CANCORR Procedure

Canonical Correlation Analysis

	Canonical Correlation	Adjusted Canonical Correlation	Approximate Standard Error	Squared Canonical Correlation	Eigenvalues of Inv(E)*H = CanRsq/(1-CanRsq)				Test of H0: The canonical correlations in the current row and all that follow are zero				
					Eigenvalue	Difference	Proportion	Cumulative	Likelihood Ratio	Approximate F Value	Num DF	Den DF	Pr > F
1	0.731925	0.677512	0.047141	0.535714	1.1538	0.5635	0.5098	0.5098	0.18137	2.79	60	434.68	<.0001
2	0.609259	0.544441	0.063845	0.371197	0.5903	0.3481	0.2608	0.7706	0.39064	1.95	45	374.38	0.0005
3	0.441595	0.299357	0.081735	0.195006	0.2422	0.0593	0.1070	0.8776	0.62124	1.34	32	311.37	0.1093
4	0.393224	.	0.085835	0.154625	0.1829	0.1051	0.0808	0.9584	0.77173	1.10	21	244.62	0.3483
5	0.268644	0.204785	0.094207	0.072169	0.0778	0.0614	0.0344	0.9928	0.91289	0.67	12	172	0.7801
6	0.126895	0.006047	0.099900	0.016102	0.0164		0.0072	1.0000	0.98390	0.28	5	87	0.9203

Multivariate Statistics and F Approximations
S=6 M=1.5 N=40

Statistic	Value	F Value	Num DF	Den DF	Pr > F
NOTE: F Statistic for Roy's Greatest Root is an upper bound.					
Wilks' Lambda	0.18136824	2.79	60	434.68	<.0001
Pillai's Trace	1.34481333	2.51	60	522	<.0001
Hotelling-Lawley Trace	2.26346729	3.04	60	279.47	<.0001
Roy's Greatest Root	1.15384311	10.04	10	87	<.0001

The CANCORR Procedure

Canonical Correlation Analysis

Raw Canonical Coefficients for the VAR Variables

	V1	V2	V3	V4	V5	V6
C2	-1.015664623	-1.799368824	0.4734981666	-3.271891062	-1.284639002	1.1020128422
C19	-10.24629373	-18.90343895	-10.57651813	38.637877526	68.144956949	14.060908279
C21	0.2684052577	3.1596741791	-3.663764435	-0.231424168	-0.858918554	-0.990705468
C22	-0.647974438	-1.91744585	0.8672159106	6.6149026268	-5.559991245	-7.26925875
C23	67.561260999	-77.11656871	-37.03965105	-139.3281277	-411.5444574	428.20315624
C30	1.1504846158	-1.202692948	3.9985823461	-3.592230275	-0.265077064	-4.450888482
C53	17.888549217	-7.327077215	-5.900129499	0.2196618563	-1.1368901	-2.562283859
C55	0.885862356	-0.425132966	0.0091746687	-0.902484667	2.1468577514	2.2550051725
C64	2.9417223852	1.097274647	3.8529985113	20.021830464	2.8729683522	8.5037723465
C74	-0.093366871	3.43946558	1.6093143589	0.5275325556	-0.65596725	0.2501383287

Raw Canonical Coefficients for the WITH Variables

	W1	W2	W3	W4	W5	W6
S1	0.0314100722	-0.006831398	-0.018356572	-0.030419926	0.0221730248	0.0560709496
S3	0.1475767659	0.1022138866	0.0622160849	0.6404296645	-0.229685219	-0.233162115
S4	-0.002784564	0.3827225656	0.0220589526	-0.584247	0.6108197994	-0.136309371
S19	-0.071475926	0.0172026271	0.0960214809	0.2109468758	0.1744738134	0.1054562948

Raw Canonical Coefficients for the WITH Variables

	W1	W2	W3	W4	W5	W6
S33	-0.254195456	0.9042836028	-2.123232122	0.2610278005	-0.005865541	-0.40394774
S36	0.139464094	0.334983617	-0.020172708	-0.392615899	-0.721574404	0.3852186574

The CANCORR Procedure

Canonical Correlation Analysis

Standardized Canonical Coefficients for the VAR Variables

	V1	V2	V3	V4	V5	V6
C2	-0.1081	-0.1916	0.0504	-0.3483	-0.1368	0.1173
C19	-0.0711	-0.1312	-0.0734	0.2682	0.4731	0.0976
C21	0.0592	0.6966	-0.8078	-0.0510	-0.1894	-0.2184
C22	-0.0312	-0.0925	0.0418	0.3190	-0.2681	-0.3505
C23	0.0975	-0.1113	-0.0535	-0.2011	-0.5940	0.6180
C30	0.1584	-0.1656	0.5506	-0.4947	-0.0365	-0.6129
C53	0.8159	-0.3342	-0.2691	0.0100	-0.0519	-0.1169
C55	0.3172	-0.1522	0.0033	-0.3232	0.7688	0.8075
C64	0.1209	0.0451	0.1583	0.8227	0.1181	0.3494
C74	-0.0220	0.8098	0.3789	0.1242	-0.1544	0.0589

Standardized Canonical Coefficients for the WITH Variables

	W1	W2	W3	W4	W5	W6
S1	0.5765	-0.1254	-0.3369	-0.5583	0.4070	1.0291
S3	0.3585	0.2483	0.1511	1.5556	-0.5579	-0.5664
S4	-0.0042	0.5807	0.0335	-0.8864	0.9268	-0.2068
S19	-0.3174	0.0764	0.4264	0.9368	0.7748	0.4683
S33	-0.1170	0.4162	-0.9773	0.1202	-0.0027	-0.1859
S36	0.1938	0.4655	-0.0280	-0.5456	-1.0028	0.5354

The CANCORR Procedure

Canonical Structure

Correlations Between the VAR Variables and Their Canonical Variables

	V1	V2	V3	V4	V5	V6
C2	0.1215	-0.0076	0.1803	-0.2002	-0.0542	0.1088
C19	-0.0395	-0.0823	-0.1312	0.1677	0.5034	0.0403
C21	0.2936	0.6585	-0.5208	-0.1470	0.0405	-0.1223
C22	0.4290	0.1232	0.1836	0.0735	-0.0600	-0.2128
C23	0.1250	-0.0405	-0.0060	-0.1542	-0.6409	0.5784

Correlations Between the VAR Variables and Their Canonical Variables

	V1	V2	V3	V4	V5	V6
C30	0.4743	0.2980	0.4886	-0.3056	0.0505	-0.3116
C53	0.9024	-0.2435	-0.1127	0.1281	-0.0777	-0.1329
C55	0.4694	0.3228	0.1279	-0.3822	0.4902	0.3124
C64	0.3488	0.2145	0.2763	0.6691	-0.0963	0.1675
C74	0.3742	0.6711	0.5517	-0.0253	0.0148	0.1235

Correlations Between the WITH Variables and Their Canonical Variables

	W1	W2	W3	W4	W5	W6
S1	0.8681	-0.1677	-0.2310	0.0529	0.2401	0.3231
S3	0.8493	0.3370	0.1246	0.3029	0.0246	-0.2393
S4	0.3869	0.7157	0.2871	-0.2087	0.3576	-0.2902
S19	-0.6089	0.3944	0.1753	0.3255	0.1784	0.5525
S33	-0.4137	0.2862	-0.8449	0.1660	0.0239	0.0706
S36	-0.2319	0.7098	0.2399	-0.0889	-0.4451	0.4228

Correlations Between the VAR Variables and the Canonical Variables of the WITH Variables

	W1	W2	W3	W4	W5	W6
C2	0.0889	-0.0046	0.0796	-0.0787	-0.0146	0.0138
C19	-0.0289	-0.0502	-0.0579	0.0659	0.1352	0.0051
C21	0.2149	0.4012	-0.2300	-0.0578	0.0109	-0.0155
C22	0.3140	0.0751	0.0811	0.0289	-0.0161	-0.0270
C23	0.0915	-0.0246	-0.0027	-0.0606	-0.1722	0.0734
C30	0.3471	0.1816	0.2158	-0.1202	0.0136	-0.0395
C53	0.6605	-0.1483	-0.0498	0.0504	-0.0209	-0.0169
C55	0.3436	0.1967	0.0565	-0.1503	0.1317	0.0396
C64	0.2553	0.1307	0.1220	0.2631	-0.0259	0.0213
C74	0.2739	0.4088	0.2436	-0.0099	0.0040	0.0157

Correlations Between the WITH Variables and the Canonical Variables of the VAR Variables

	V1	V2	V3	V4	V5	V6
S1	0.6354	-0.1022	-0.1020	0.0208	0.0645	0.0410
S3	0.6216	0.2053	0.0550	0.1191	0.0066	-0.0304
S4	0.2832	0.4361	0.1268	-0.0821	0.0961	-0.0368
S19	-0.4456	0.2403	0.0774	0.1280	0.0479	0.0701
S33	-0.3028	0.1743	-0.3731	0.0653	0.0064	0.0090
S36	-0.1698	0.4325	0.1060	-0.0349	-0.1196	0.0536

SAS-PROGRAM

```
proc print data=satisfaction;
run;

title 'M1';
proc reg data=satisfaction plots=none;
model life = econ familiy social work;
run;

title 'M2';
proc reg data=satisfaction;
model life = econ familiy social work /p r i influence CLB
selection=stepwise;
run;
```

Some SAS-outputs have been omitted or truncated

Obs	life	econ	familiy	social	work
1	7.3	5.8	8.0	7.6	7.3
2	7.4	6.4	8.1	7.6	7.5
3	7.6	7.1	8.0	7.7	7.3
4	7.7	7.7	8.1	7.7	7.4
5	7.8	8.2	8.1	7.9	7.6
6	7.8	8.4	8.1	7.8	7.9
7	8.2	8.9	8.3	8.0	7.9

M1

The REG Procedure
Model: MODEL1
Dependent Variable: life

Number of Observations Read	7
Number of Observations Used	7

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	0.51790	0.12947	24.26	0.0400
Error	2	0.01067	0.00534		
Corrected Total	6	0.52857			

Root MSE	0.07305	R-Square	0.9798
Dependent Mean	7.68571	Adj R-Sq	0.9394
Coeff Var	0.95049		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-4.01016	3.99101	-1.00	0.4208
econ	1	0.15755	0.07215	2.18	0.1607
familiy	1	0.93468	0.53327	1.75	0.2217
social	1	0.56447	0.52673	1.07	0.3960
work	1	-0.18993	0.22125	-0.86	0.4811

M2

The REG Procedure
Model: MODEL1
Dependent Variable: life

Number of Observations Read	7
Number of Observations Used	7

Stepwise Selection: Step 1

Variable econ Entered: R-Square = 0.9129 and C(p) = 5.6232

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.48255	0.48255	52.43	0.0008
Error	5	0.04602	0.00920		
Corrected Total	6	0.52857			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	5.79087	0.26419	4.42209	480.47	<.0001
econ	0.25265	0.03489	0.48255	52.43	0.0008

Bounds on condition number: 1, 1

Stepwise Selection: Step 2

Variable familiy Entered: R-Square = 0.9589 and C(p) = 3.0672

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.50687	0.25343	46.71	0.0017
Error	4	0.02170	0.00543		
Corrected Total	6	0.52857			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-1.27382	3.34363	0.00078755	0.15	0.7226
econ	0.19251	0.03905	0.13187	24.30	0.0079
familiy	0.92787	0.43834	0.02431	4.48	0.1017

Bounds on condition number: 2.1246, 8.4984

All variables left in the model are significant at the 0.1500 level.

No other variable met the 0.1500 significance level for entry into the model.

Summary of Stepwise Selection								
Step	Variable Entered	Variable Removed	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	econ		1	0.9129	0.9129	5.6232	52.43	0.0008
2	familiy		2	0.0460	0.9589	3.0672	4.48	0.1017

M2

The REG Procedure
Model: MODEL1
Dependent Variable: life

Number of Observations Read	7
Number of Observations Used	7

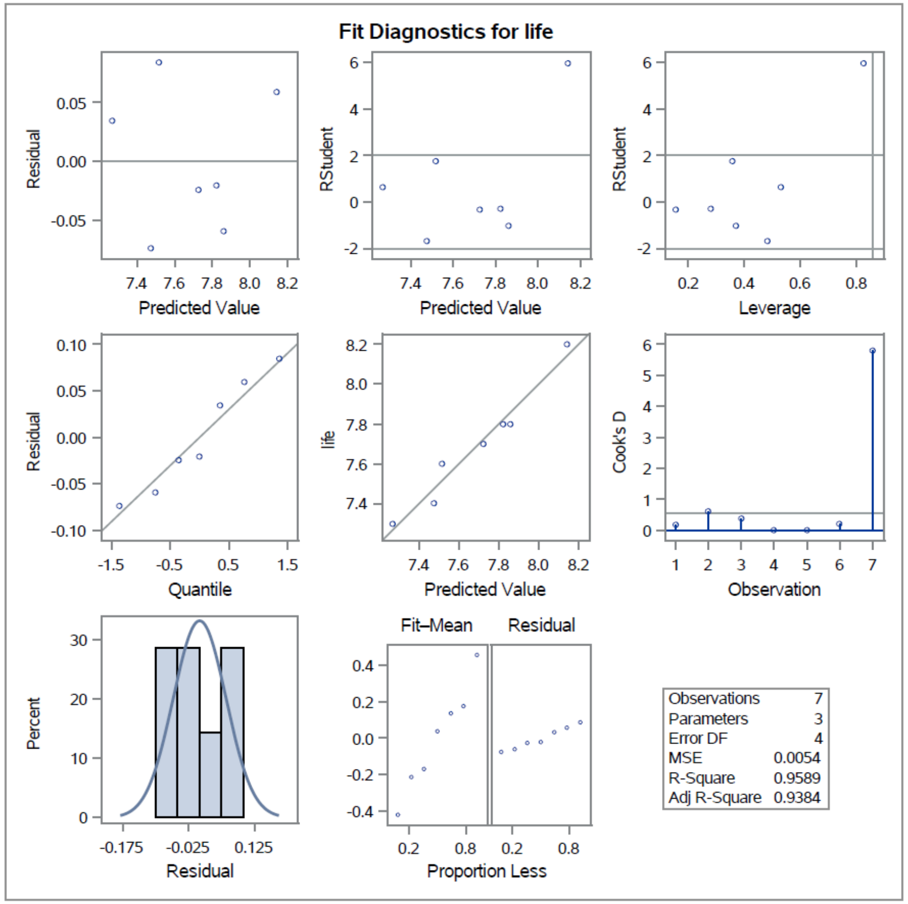
X'X Inverse, Parameter Estimates, and SSE				
Variable	Intercept	econ	familiy	life
Intercept	2060.3377049	16.482435597	-269.6065574	-1.27381733
econ	16.482435597	0.281030445	-2.295081967	0.1925058548
familiy	-269.6065574	-2.295081967	35.409836066	0.9278688525
life	-1.27381733	0.1925058548	0.9278688525	0.021704918

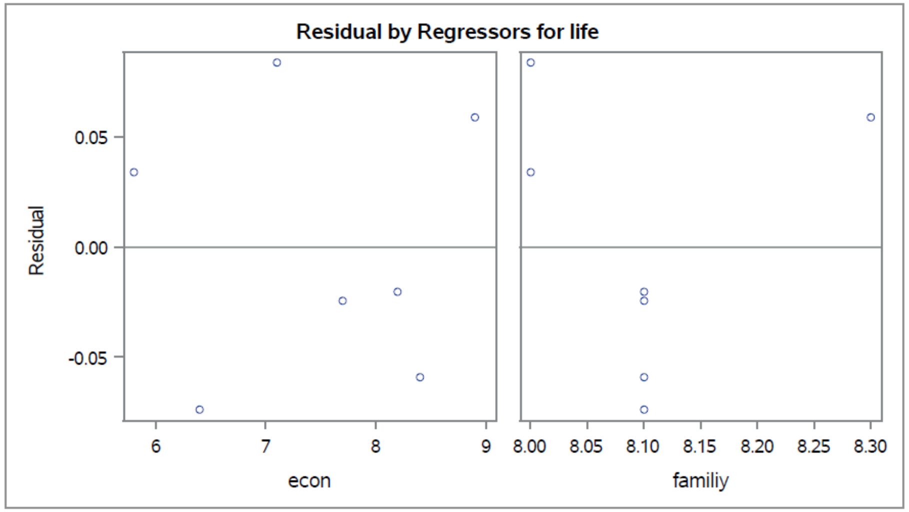
M2

The REG Procedure
Model: MODEL1
Dependent Variable: life

Output Statistics														
												DFBETAS		
Obs	Dependent Variable	Predicted Value	Std Error Mean Predict	Residual	Std Error Residual	Student Residual	Cook's D	RStudent	Hat Diag H	Cov Ratio	DFFITS	Intercept	econ	familiy
1	7.3	7.2657	0.0536	0.0343	0.0506	0.679	0.172	0.6251	0.5288	3.4840	0.6623	-0.0184	-0.4265	0.0552
2	7.4	7.4740	0.0512	-0.0740	0.0530	-1.396	0.607	-1.6888	0.4829	0.6176	-1.6320	0.9307	1.3695	-0.9964
3	7.6	7.5159	0.0441	0.0841	0.0590	1.425	0.378	1.7583	0.3583	0.4412	1.3139	0.9918	0.4848	-0.9675
4	7.7	7.7242	0.0289	-0.0242	0.0677	-0.357	0.008	-0.3146	0.1541	2.5422	-0.1343	-0.0259	-0.0363	0.0264
5	7.8	7.8205	0.0390	-0.0205	0.0625	-0.328	0.014	-0.2876	0.2806	3.0366	-0.1796	-0.0873	-0.1258	0.0915
6	7.8	7.8590	0.0448	-0.0590	0.0584	-1.009	0.200	-1.0120	0.3705	1.5601	-0.7764	-0.4209	-0.6086	0.4428
7	8.2	8.1408	0.0669	0.0592	0.0308	1.920	5.788	5.9493	0.8248	0.0065	12.9095	-9.6148	-1.7583	9.2417

Sum of Residuals	0
Sum of Squared Residuals	0.02170
Predicted Residual SS (PRESS)	0.16756





SAS-PROGRAM

```
proc princomp data=home.socialcrime plots=(scree score) cov;
var C2 C19 C21 C22 C23 C30 C53 C55 C64 C74;
run;
```

Some SAS-outputs have been omitted or truncated

The PRINCOMP Procedure

Observations	98
Variables	10

Covariance Matrix

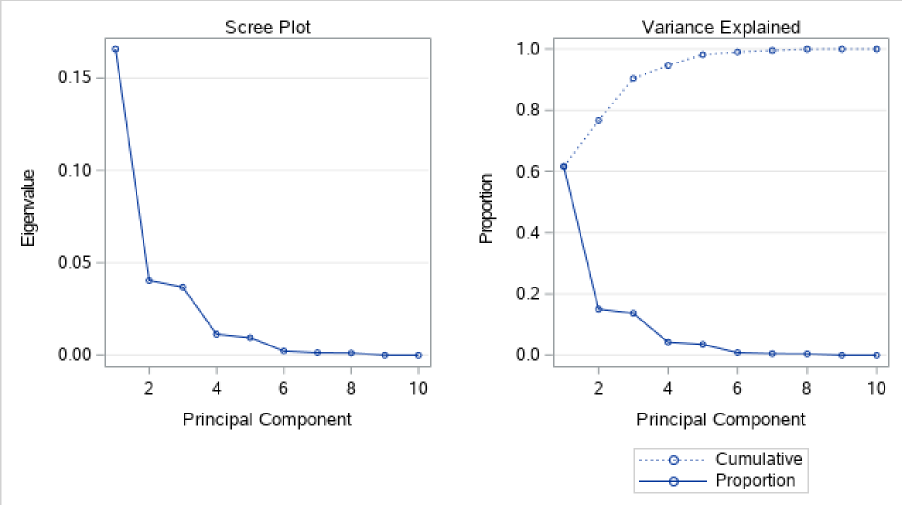
Variable	C2	C19	C21	C22	C23	C30	C53	C55	C64	C74
C2	0.01133	0.00003	0.00363	0.00093	-0.00000	0.00383	0.00059	0.00723	0.00128	0.00608
C19	0.00003	0.00005	0.00020	0.00001	-0.00000	0.00008	-0.00000	0.00019	-0.00001	-0.00001
C21	0.00363	0.00020	0.04861	0.00295	0.00000	0.01076	0.00091	0.03148	0.00124	0.01147
C22	0.00093	0.00001	0.00295	0.00233	0.00000	0.00315	0.00060	0.00806	0.00041	0.00417
C23	-0.00000	-0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	-0.00001	0.00000	0.00003
C30	0.00383	0.00008	0.01076	0.00315	0.00001	0.01896	0.00132	0.02344	0.00146	0.01831
C53	0.00059	-0.00000	0.00091	0.00060	0.00000	0.00132	0.00208	0.00205	0.00048	0.00160
C55	0.00723	0.00019	0.03148	0.00806	-0.00001	0.02344	0.00205	0.12824	0.00048	0.04209
C64	0.00128	-0.00001	0.00124	0.00041	0.00000	0.00146	0.00048	0.00048	0.00169	0.00338
C74	0.00608	-0.00001	0.01147	0.00417	0.00003	0.01831	0.00160	0.04209	0.00338	0.05543

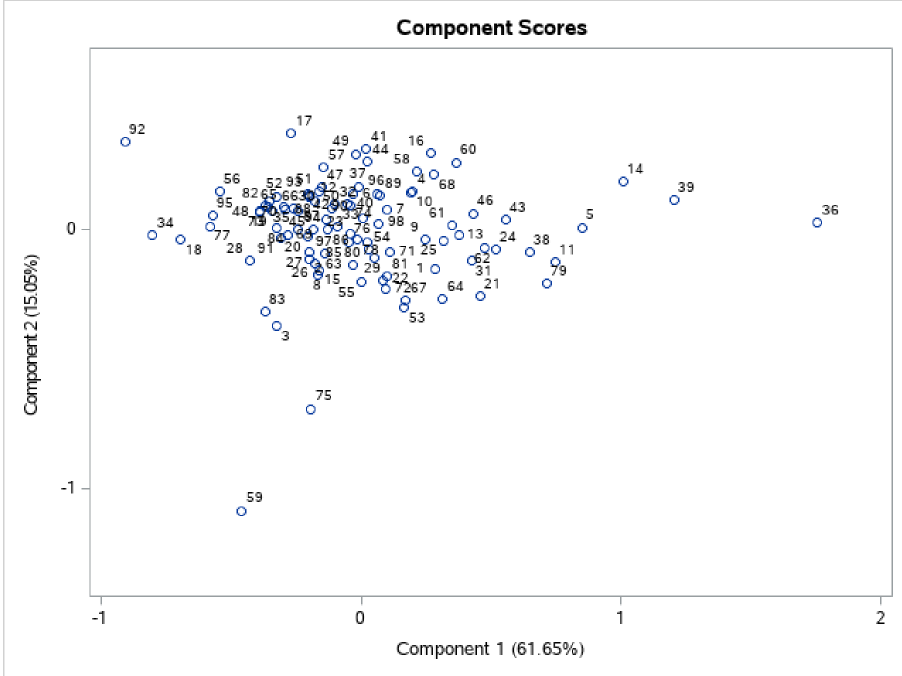
Total Variance	0.2687170122

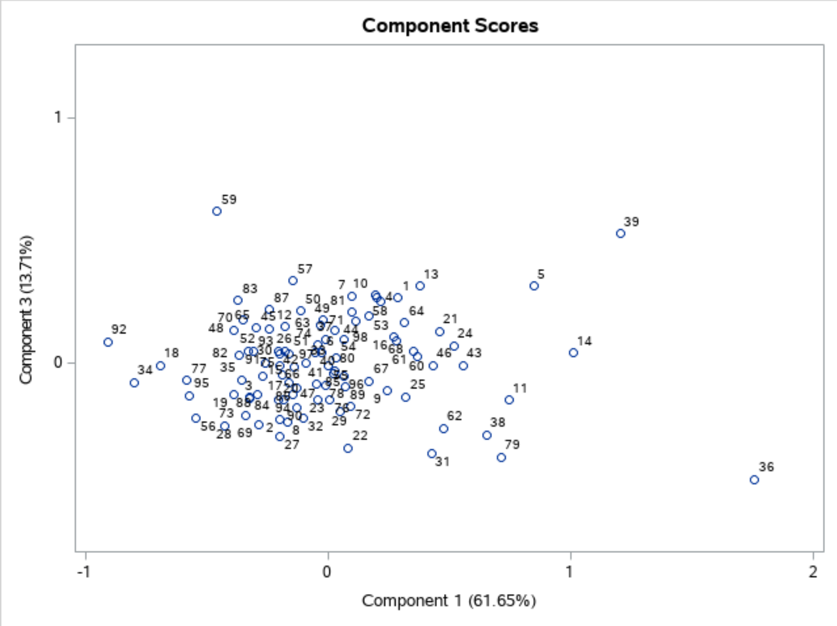
Eigenvalues of the Covariance Matrix

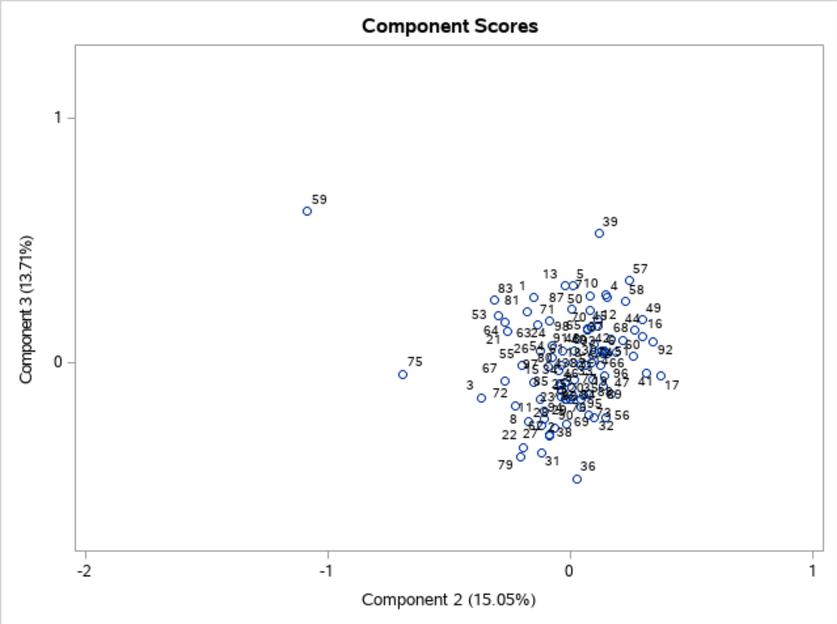
	Eigenvalue	Difference	Proportion	Cumulative
1	0.16565697	0.12520523	0.6165	0.6165
2	0.04045175	0.00362367	0.1505	0.7670
3	0.03682808	0.02543139	0.1371	0.9041
4	0.01139668	0.00191702	0.0424	0.9465
5	0.00947966	0.00718552	0.0353	0.9818
6	0.00229415	0.00089882	0.0085	0.9903
7	0.00139533	0.00022980	0.0052	0.9955
8	0.00116553	0.00111871	0.0043	0.9998
9	0.00004682	0.00004477	0.0002	1.0000
10	0.00000205		0.0000	1.0000

Eigenvectors										
	Prin1	Prin2	Prin3	Prin4	Prin5	Prin6	Prin7	Prin8	Prin9	Prin10
C2	0.067496	0.047888	0.101836	0.674163	0.719372	-.070848	0.010343	-.075205	-.002439	0.000572
C19	0.001408	-.003900	0.001322	0.004229	-.001895	-.006114	-.001443	-.006478	0.999926	0.005064
C21	0.288262	-.685112	0.650626	-.143021	0.057882	-.009877	-.005685	-.016310	-.003398	-.000128
C22	0.061321	0.008694	0.018889	0.085220	-.065658	0.461414	0.873349	-.092636	0.002926	-.001318
C23	0.000046	0.000485	0.000602	-.000522	-.000363	0.000938	0.001038	0.000043	-.005054	0.999986
C30	0.208282	0.126746	0.239590	0.640876	-.672894	-.121559	-.069350	0.005675	-.004908	0.000036
C53	0.018183	0.012023	0.020934	0.068622	-.019339	0.807598	-.473110	-.343443	0.001698	-.000233
C55	0.842662	-.130116	-.518551	-.026617	0.031368	-.006435	-.034690	0.034018	-.000708	0.000371
C64	0.015356	0.044196	0.076453	0.063862	0.056614	0.338066	-.085243	0.929013	0.007850	-.000243
C74	0.393140	0.702243	0.483090	-.312332	0.132245	-.024907	0.002482	-.056982	0.002604	-.000728






Component Scores
Component 3 (13.71%)
Component 1 (61.65%)


Component Scores
Component 3 (13.71%)
Component 2 (15.05%)