ETUDE DE LA CROISSANCE D'ARBRES

Des forestiers ont réalisé des plantations d'arbres en 3 endroits.
Plusieurs années plus tard, ils souhaitent savoir si la hauteur des arbres est identique dans les 3 forêts.

Pour cela, ils ont mesuré la hauteur d'un certain nombre d'arbres échantillonnés dans chacune des forêts:

- ☞ 6 arbres pour la première forêt,
- ☞7 arbres pour la seconde forêt,
- ☞ 5 arbres pour la troisième forêt.

Résultats des mesures de hauteur des 18 arbres pour les 3 forêts:

forêt 1	forêt 2	forêt 3
23.4	18.9	22.5
24.4	21.1	22.9
24.6	21.1	23.7
24.9	22.1	24.0
25.0	22.5	24.0
26.2	23.5	
	24.5	

arbrebis.lst

The SAS System

General Linear Models Procedure
Class Level Information

Class	Levels	Values
I	3	1 2 3

Number of observations in data set = 18

ARBRES

arbrebis.lst

The SAS System

General Linear Models Procedure

The X'X Matrix

	INTERCEPT	I 1	I 2	I 3	TAILLE
INTERCEPT	18	6	7	5	419.3
I 1	6	6	0	0	148.5
I 2	7	0	7	0	153.7
I 3	5	0	0	5	117.1
TAILLE	419.3	148.5	153.7	117.1	9818.67

arbrebis.lst

The SAS System

General Linear Models Procedure

Dependent Variable: TAILLE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	25.30930159	12.65465079	7.30	0.0061
Error	15	26.00014286	1.73334286		
Corrected Total	17	51.30944444			

R-Square	C.V.	Root MSE	TAILLE Mean
0.493268	5.651840	1.31656479	23.29444444

Source	DF	Type I SS	Mean Square	F Value	Pr > F
I	2	25.30930159	12.65465079	7.30	0.0061

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		23.42000000 B	39.78	0.0001	0.58878568
I	1	1.33000000 B	1.67	0.1160	0.79721957
	2	-1.46285714 B	-1.90	0.0772	0.77090141
	3	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.
Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

ETUDE DES POIDS DE GRAINS DE COLZA

On souhaite étudier l'effet des 2 facteurs *rotation* et *fertilisation*sur le poids des grains de colza. Les résultats expérimentaux sont les suivants:

	rotation A	**rotation B**	**rotation C**
niveau 1 de fertilisation	27.6	32.1	27.8
	16.3	28.5	33.4
	11.4	19.4	33.0
	38.2	39.2	28.9
	38.1	21.8	24.6
	24.7	23.6	28.3
	22.7	14.0	40.6
	21.7	22.3	20.3
	20.6	18.3	26.7
	19.8	20.8	22.8
niveau 2 de fertilisation	13.4	15.5	23.5
	19.0	16.7	31.2
	27.8	29.7	26.1
	17.4	26.8	41.2
	8.3	8.7	35.3
	16.2	22.6	23.4
	3.4	34.6	44.1
	9.6	14.4	35.3
	24.8	12.5	31.6
	18.2	16.9	25.8

The SAS System

General Linear Models Procedure

Dependent Variable: POIDS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1326.18716667	442.06238889	7.31	0.0003
Error	56	3386.10533333	60.46616667		
Corrected Total	59	4712.29250000			

R-Square	C.V.	Root MSE	POIDS Mean
0.281431	32.36628	7.77599940	24.02500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ROT	2	1180.48300000	590.24150000	9.76	0.0002
FERT	1	145.70416667	145.70416667	2.41	0.1262

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		28.63666667 B	14.26	0.0001	2.00775441
ROT	1	-10.23500000 B	-4.16	0.0001	2.45898692
	2	-8.27500000 B	-3.37	0.0014	2.45898692
	3	0.00000000 B	.	.	.
FERT	1	3.11666667 B	1.55	0.1262	2.00775441
	2	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.
Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

COLZA

The SAS System

General Linear Models Procedure

Dependent Variable: POIDS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1659.82150000	331.96430000	5.87	0.0002
Error	54	3052.47100000	56.52724074		
Corrected Total	59	4712.29250000			

R-Square	C.V.	Root MSE	POIDS Mean
0.352232	31.29432	7.51846000	24.02500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
ROT	2	1180.48300000	590.24150000	10.44	0.0001
FERT	1	145.70416667	145.70416667	2.58	0.1142
ROT*FERT	2	333.63433333	166.81716667	2.95	0.0608

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		31.75000000 B	13.35	0.0001	2.37754581
ROT	1	-15.94000000 B	-4.74	0.0001	3.36235753
	2	-11.91000000 B	-3.54	0.0008	3.36235753
	3	0.00000000 B	.	.	.
FERT	1	-3.11000000 B	-0.92	0.3591	3.36235753
	2	0.00000000 B	.	.	.
ROT*FERT	1 1	11.41000000 B	2.40	0.0199	4.75509162
	1 2	0.00000000 B	.	.	.
	2 1	7.27000000 B	1.53	0.1321	4.75509162
	2 2	0.00000000 B	.	.	.
	3 1	0.00000000 B	.	.	.
	3 2	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.
Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.