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1      **EXAMPLE 4*****;
2      *** Example of RBD ***;
3      *** From Snedecor & Cochran, 1980 (pg 256) ***;
4      *****;
5      OPTIONS PS=256 LS=78 NOCENTER NODATE PAGENO=1;
6      DATA SOYBEAN; INFILE CARDS MISSEVER;
7          INPUT TREATMNT $ BLOCK FAILURES;
8          TITLE1 'FAILURES TO GERMINATE OF SOYBEAN PLANTS';
9          TITLE2 '4 TREATMENTS AND A CONTROL, 5 BLOCKS';
10     CARDS;
11     ;
12     ;
13     PROC MIXED DATA=SOYBEAN cl COVTEST; CLASSES TREATMNT BLOCK;
14     TITLE3 'ANOVA with PROC MIXED - RBD without reps';
15     MODEL FAILURES = TREATMNT / htype=3 DDFM=Satterthwaite outp=ResidDataP;
16     RANDOM BLOCK;
17     *** Treatment levels ----- ARASAN CHECK FERMATE SEMESAN SPERGON;
18     CONTRAST 'Check v others' TREATMNT 1 -4 1 1 1! ;
19     CONTRAST 'S v others' TREATMNT -1 0 -1 1 1;
20     CONTRAST 'A v others' TREATMNT -3 0 1 1 1;
21     CONTRAST 'F v others' TREATMNT 1 0 -3 1 1;
22     RUN;
23     NOTE: Convergence criteria met.
24     NOTE: The data set WORK.RESIDDATAP has 25 observations and 10 variables.
25     NOTE: The PROCEDURE MIXED printed page 1.
26     NOTE: PROCEDURE MIXED used:
27         real time          0.23 seconds
28         cpu time           0.18 seconds

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FAILURES TO GERMINATE OF SOYBEAN PLANTS

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4 TREATMENTS AND A CONTROL, 5 BLOCKS

ANOVA with PROC MIXED - RBD without reps

Class Level Information

Class	Levels	Values
TREATMNT	5	ARASAN CHECK FERMATE SEMESAN SPERGON
BLOCK	5	1 2 3 4 5

Covariance Parameter Estimates

Cov Parm	Estimate	Standard		Pr > Z	Alpha	Lower	Upper
		Error	Z				
BLOCK	1.4100	1.8032	0.78	0.2171	0.05	0.3075	430.52
Residual	5.4100	1.9127	2.83	0.0023	0.05	3.0008	12.5310

Fit Statistics

-2 Res Log Likelihood	101.9
AIC (smaller is better)	105.9
AICC (smaller is better)	106.6
BIC (smaller is better)	105.1

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
TREATMNT	4	16	3.87	0.0219

Contrasts

Label	Num DF	Den DF	F Value	Pr > F
Check v others	1	16	12.43	0.0028
S v others	1	16	1.81	0.1971
A v others	1	16	0.31	0.5865
F v others	1	16	1.00	0.3326

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48      **EXAMPLE 5*****;
49      *** Example of RBD with sampling error          ***;
50      *** From Snedecor & Cochran, 1980 (pg 267)      ***;
51      *****;
52      OPTIONS PS=256 LS=78 NOCENTER NODATE PAGENO=1;
53      DATA FUMIGANT; INFILE CARDS MISSEVER;
54      INPUT FUMIGANT $ BLOCK $ W1 W2 W3 W4;
55      TITLE1 'Number of wire worms found for 2 fumigants and a control';
56      TITLE2 'Fumigants are C and S, control is 0, 5 BLOCKS';
57      REP=1; WORMS=W1; LWORMS=LOG(WORMS+1); OUTPUT;
58      REP=2; WORMS=W2; LWORMS=LOG(WORMS+1); OUTPUT;
59      REP=3; WORMS=W3; LWORMS=LOG(WORMS+1); OUTPUT;
60      REP=4; WORMS=W4; LWORMS=LOG(WORMS+1); OUTPUT;
61      KEEP FUMIGANT BLOCK REP WORMS LWORMS;
62      CARDS;
63
64      PROC mixed DATA=FUMIGANT cl; CLASSES FUMIGANT BLOCK REP;
65      TITLE3 'ANOVA with PROC MIXED - RBD with reps';
66      MODEL WORMS = FUMIGANT / htype=3 DDFM=Satterthwaite outp=ResidDataP
67      outpM=ResidDataPM;
68
69      RANDOM BLOCK FUMIGANT*BLOCK;
70
71      *** FUMIGANT levels ----- 0 C S;
72      CONTRAST 'Control v othrs' FUMIGANT -2 1 1;
73      CONTRAST 'C v S' FUMIGANT 0 -1 1;
74
75      RUN;

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Number of wire worms found for 2 fumigants and a control

1

Fumigants are C and S, control is 0, 5 BLOCKS

ANOVA with PROC MIXED - RBD with reps

Class Level Information

Class	Levels	Values
FUMIGANT	3	0 C S
BLOCK	5	I II III IV V
REP	4	1 2 3 4

Covariance Parameter Estimates

Cov Parm	Estimate	Alpha	Lower	Upper
BLOCK	1.1052	0.05	0.1473	25730931
FUMIGANT*BLOCK	3.8559	0.05	1.2517	50.5437
Residual	9.1056	0.05	6.2643	14.4450

Fit Statistics

-2 Res Log Likelihood	310.3
AIC (smaller is better)	316.3
AICC (smaller is better)	316.7
BIC (smaller is better)	315.1

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
FUMIGANT	2	8	5.98	0.0258

Contrasts

Label	Num DF	Den DF	F Value	Pr > F
Control v othrs	1	8	11.88	0.0087
C v S	1	8	0.08	0.7812

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89      **EXAMPLE 6*****;
90      *** Example of Latin Square Design      ***;
91      *** From Snedecor & Cochran, 1980 (pg 271)      ***;
92      *****;
93      OPTIONS PS=256 LS=78 NOCENTER NODATE PAGENO=1;
94      DATA MILLET; INFILE CARDS MISSOEVER;
95          INPUT ROW COLUMN Spacing $ YIELD;
96          TITLE1 'LATIN SQUARE WITH 5 ROWS, COLUMNS AND TREATMENTS';
97          TITLE2 'MILLET YIELDS (G) FOR SPACINGS OF 2, 4, 6, 8 AND 10 INCHES';
98          CARDS;
NOTE: The data set WORK.MILLET has 25 observations and 4 variables.
NOTE: DATA statement used:
      real time          0.03 seconds
      cpu time           0.03 seconds
124      ;
125      PROC MIXED DATA=MILLET cl; CLASSES ROW COLUMN Spacing;
126          TITLE3 'ANOVA with PROC MIXED - Latin Square';
127          MODEL YIELD = Spacing / htype=3 DDFM=Satterthwaite outp=ResidDataP;
128          RANDOM ROW COLUMN;
129          *** Row spacing levels ----- A B C D E;
130      CONTRAST 'Linear ' Spacing -2 -1 0 1 2;
131      CONTRAST 'Quadratic' Spacing 2 -1 -2 -1 2;
132      CONTRAST 'Cubic ' Spacing -1 2 0 -2 1;
133      CONTRAST 'Quartic ' Spacing 1 -4 6 -4 1;
134      RUN;

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LATIN SQUARE WITH 5 ROWS, COLUMNS AND TREATMENTS

1

MILLET YIELDS (G) FOR SPACINGS OF 2, 4, 6, 8 AND 10 INCHES

ANOVA with PROC MIXED - Latin Square

Class Level Information

Class	Levels	Values
ROW	5	1 2 3 4 5
COLUMN	5	1 2 3 4 5
Spacing	5	A B C D E

Covariance Parameter Estimates

Cov Parm	Estimate	Alpha	Lower	Upper
ROW	468.95	0.05	122.70	24267
COLUMN	96.1867	0.05	11.8899	7.401E10
Residual	1055.61	0.05	542.81	2876.45

Fit Statistics

-2 Res Log Likelihood	210.2
AIC (smaller is better)	216.2
AICC (smaller is better)	217.7
BIC (smaller is better)	215.1

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Spacing	4	12	0.98	0.4523

Contrasts

Label	Num DF	Den DF	F Value	Pr > F
Linear	1	12	3.75	0.0766
Quadratic	1	12	0.03	0.8713
Cubic	1	12	0.14	0.7178
Quartic	1	12	0.02	0.8860