A study by Apex Enterprises investigated the ratings of potential employees by its personnel officers. Five personnel officers were selected at random, and four prospective employees were assigned at random to each selected officer.

```
options nodate nonumber ls=80 nocenter; data apex; input officer  $ rating @@;
datalines;
A 76 A 65 A 85 A 74 B 59 B 75 B 81 B 67 C 49 C 63
C 61 C 46 D 74 D 71 D 85 D 89 E 66 E 84 E 80 E 79
;

proc varcomp data = apex;
class officer;
model rating = officer; run;
```

Variance Component	rating
Var(officer)	80.41042
Var(Error)	73.28333

```
proc mixed data = apex cl alpha=0.1;
class officer;
model rating = / cl alpha=0.05 DDFM = SATTERTHWAITE;
random officer; run;
```

The cl option after data=apex asks for the confidence limits.

The class statement lists all the categorical variables just as in glm.

The model rating =; line looks strange. In proc mixed, the model statement lists only the fixed effects. Then the random effects are listed separately in the random statement. In our example, there were no fixed effects, so we had no predictors on the model line. We had one random effect, so it went on the random line.

This is different from glm, where all the factors (fixed and random) are listed on the model line, and then the random ones are repeated in the random statement.

Just in case you're not confused enough, proc varcomp assumes all factors are random effects unless they are specified as fixed …

proc mixed gives a huge amount of output. Here are some pieces of it.

Cov Parm	Estimate	Alpha	Lower	Upper
officer	80.4104	0.1	29.5215	865.42
Residual	73.2833	0.1	43.9774	151.39

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha
Intercept	71.4500	4.4437	4	16.08	<.0001	0.05

Solution for Fixed Effects	Effect	Lower	Upper
	Intercept	59.1124	83.7876

Example Pages 1082-1083 #'s 17.5, 17.6
One Factor in RCB – Random Factor & Random Block

```
options nodate nonumber ls=80 nocenter;
data dna;
input Subject    Analyst    DNAcontent @@;
datalines;
1       1       9.9000   2       1       10.6000  3       1       11.5000
4       1       11.3000  5       1       10.5000  6       1       8.0000
7       1       10.6000  8       1       12.2000  9       1       8.0000
10      1       9.7000   1       2       10.2000  2       2       10.6000
3       2       11.3000  4       2       11.6000  5       2       10.3000
6       2       8.2000   7       2       10.7000  8       2       12.8000
9       2       7.9000   10      2       9.6000   1       3       10.1000
2       3       10.5000  3       3       11.1000  4       3       11.3000
5       3       10.1000  6       3       7.9000   7       3       10.4000
8       3       12.6000  9       3       7.7000   10      3       9.3000
1       4       10.2000  2       4       10.5000  3       4       11.2000
4       4       11.3000  5       4       10.2000  6       4       7.9000
7       4       10.5000  8       4       12.7000  9       4       7.8000
10      4       9.4000   1       5       10.4000  2       5       10.9000
3       5       11.4000  4       5       11.6000  5       5       10.6000
6       5       8.4000   7       5       10.9000  8       5       12.5000
9       5       8.1000   10      5       9.5000
;

proc glm data = dna;
class subject analyst;
model DNAcontent = subject analyst;
random subject analyst / test;
run;
```

```
Source                    Type III Expected Mean Square

Subject                   Var(Error) + 5 Var(Subject)

Analyst                   Var(Error) + 10 Var(Analyst)

Tests of Hypotheses for Random Model Analysis of Variance

Dependent Variable: DNAcontent

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

Subject                       9      94.457000      10.495222    538.22   <.0001
Analyst                       4       0.666000       0.166500      8.54   <.0001

Error: MS(Error)             36       0.702000       0.019500
```

```
proc mixed data = dna cl;
class subject analyst;
model DNAcontent = / solution cl DDFM = SATTERTHWAITE;
random subject analyst;
run;
```

```
Cov Parm     Estimate     Alpha       Lower       Upper

Subject        2.0951      0.05      0.9901      7.0032
Analyst       0.01470      0.05    0.004788      0.1895
Residual      0.01950      0.05     0.01290     0.03290

                         Solution for Fixed Effects

                           Standard
Effect        Estimate       Error      DF    t Value    Pr > |t|     Alpha

Intercept      10.2500      0.4614    9.25      22.22      <.0001      0.05

    Solution for Fixed Effects

Effect           Lower       Upper

Intercept       9.2106     11.2894
```