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Language : Fortran **Revised:**

Correlated Gaussian-distributed Random Numbers

`CORGEN` generates vectors of single-precision random numbers in a Gaussian distribution of mean zero and covariance matrix `V`. The generator must first be set up by a call to `CORSET` which transforms the covariance matrix `V` to an appropriate *square root* matrix `C` which is then used by `CORGEN`. `CORGEN` uses the Gaussian generator `RNORML` (V120) underneath, which in turn uses the uniform generator `RANMAR` (V113) underneath, so initialization is performed as in V113, but beware that this also initializes both `RANMAR` and `RNORML`! The code is portable Fortran, but the results are not guaranteed to be identical on all platforms as explained in `RNORML` (V120).

Structure:

`SUBROUTINE` Subprograms
User Entry Names: `CORSET`, `CORGEN`

Usage:

```
DIMENSION V(n,n), C(n,n), X(n)
CALL CORSET(V,C,n)
DO ...
  CALL CORGEN(C,X,n)
```

The call to `CORSET` transforms covariance matrix `V` to `C`. The call to `CORGEN` uses `C` to generate vector `X` of correlated Gaussian variables with covariance matrix `V`.

The limitation $n \leq 100$ is imposed by the dimension of an intermediate storage vector in `CORSET`.

Note that `CORSET` takes longer than `CORGEN` (for medium to large matrices). If it is desired to generate numbers according to a few different matrices, then each pair `Vi`, `Ci` must be separately dimensioned and saved as long as it is needed.

Method:

The square root method seems to be an old one whose origins are not known to the author (Ref. 1, p. 1182).

References:

1. F. James, Monte Carlo theory and practice, Rep. Prog. Phys. **43** (1980) 1145–1189.

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