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Multidimensional Integration or Random Number Generation

OBSOLETE

Please note that this routine has been obsoleted in CNL 223. Users are advised not to use it any longer and to replace it in older programs. No maintenance for it will take place and it will eventually disappear.

Suggested replacement: (in part) `RADMUL` (D120)

`DIVON4` is designed for integration of scalar functions of several variables, especially functions not smooth enough to be integrated reliably using Gaussian quadrature. It can also be used effectively to generate random points in a multidimensional space, with point density given by any bounded function. The heart of the package is an algorithm for recursive multi-dimensional partitioning of the space into subregions of approximately constant function value (minimum range criterion).

Structure:

`SUBROUTINE` package

User Entry Names: `BUKDMP`, `DIVON`, `DVNOPT`, `GENPNT`, `INTGRL`, `PARTN`, `RANGEN`, `TREDMP`, `USRINT`, `USRTRM`, `DVNBKD`, `EXMBUC`, `SPLIT`, `QUASI`, `RECPAR`, `BOUNDS`, `TREAUD`, `NODAUD`, `BUCMVE`, `QUAD`, `FEQN`, `NOCUT`, `TSTEXT`, `DELSLV`, `FUN`, `BUFOPT`, `BNDOPT`, `SETTOL`, `BNDTST`, `DVCOPY`, `GRDCMP`, `DELETE`, `BFGS`, `MODCHL`, `NMDCHL`, `DVDOT`, `LDLSOL`, `SHRNK`, `FEASMV`, `ADDBND`, `MULCHK`, `DELBND`, `LOCSCH`, `ORTHVC`, `MXSTEP`, `NEWPTR`, `RLEN`, `RANUMS`

Files Referenced: Printer and optional user-defined external file

External References: `NRAN` (V105), user-supplied `FUNCTION` subprogram `DFUN`

Usage:

The function (integrand) is defined by a user-supplied `FUNCTION` subprogram which must have the name `DFUN` and must calculate the integrand in double-precision mode:

```
FUNCTION DFUN(ND,X)
DOUBLE PRECISION DFUN,X(ND)
...
DFUN = ...
...
RETURN
END
```

`ND` (`INTEGER`) Number of integration variables.

`X` (`DOUBLE PRECISION`) Array containing the coordinates of the point in the integration volume at which `DFUN` is to be evaluated.

See **Long Write-up** for details.

References:

1. J.H. Friedman and M.H. Wright, A Nested Partitioning Procedure for Numerical Multiple Integration. ACM Trans. Math. Software **7** (1981) 76–92.

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