

## GAMS Index for the NAG Fortran 77 Library

This index classifies NAG Fortran 77 Library routines according to Version 2 of the GAMS classification scheme described in [1]. Note that only those GAMS classes which contain Library routines, either directly or in a subclass, are included below.

<b>A</b>	Arithmetic, error analysis	
<b>A3</b>	Real	
<b>A3a</b>	Standard precision	
	<b>F06BLF</b>	Compute quotient of two real scalars, with overflow flag
<b>A4</b>	Complex	
<b>A4a</b>	Standard precision	
	<b>A02ABF</b>	Modulus of complex number
	<b>A02ACF</b>	Quotient of two complex numbers
	<b>F06CLF</b>	Compute quotient of two complex scalars, with overflow flag
<b>A7</b>	Sequences (e.g., convergence acceleration)	
	<b>C06BAF</b>	Acceleration of convergence of sequence, Shanks' transformation and epsilon algorithm
<b>C</b>	Elementary and special functions ( <i>search also class L5</i> )	
<b>C1</b>	Integer-valued functions (e.g., factorial, binomial coefficient, permutations, combinations, floor, ceiling)	
<b>C2</b>	Powers, roots, reciprocals	
	<b>A02AAF</b>	Square root of complex number
<b>C3</b>	Polynomials	
<b>C3a</b>	Orthogonal	
<b>C3a2</b>	Chebyshev, Legendre	
	<b>C06DBF</b>	Sum of a Chebyshev series
	<b>E02AEF</b>	Evaluation of fitted polynomial in one variable from Chebyshev series form (simplified parameter list)
	<b>E02AHF</b>	Derivative of fitted polynomial in Chebyshev series form
	<b>E02AJF</b>	Integral of fitted polynomial in Chebyshev series form
	<b>E02AKF</b>	Evaluation of fitted polynomial in one variable from Chebyshev series form
<b>C4</b>	Elementary transcendental functions	
<b>C4a</b>	Trigonometric, inverse trigonometric	
	<b>F06BCF</b>	Recover cosine and sine from given real tangent
	<b>F06CCF</b>	Recover cosine and sine from given complex tangent, real cosine
	<b>F06CDF</b>	Recover cosine and sine from given complex tangent, real sine
	<b>S07AAF</b>	$\tan x$
	<b>S09AAF</b>	$\arcsin x$
	<b>S09ABF</b>	$\arccos x$
<b>C4b</b>	Exponential, logarithmic	
	<b>S01BAF</b>	$\ln(1+x)$
	<b>S01EAF</b>	Complex exponential, $e^z$
<b>C4c</b>	Hyperbolic, inverse hyperbolic	
	<b>S10AAF</b>	$\tanh x$
	<b>S10ABF</b>	$\sinh x$
	<b>S10ACF</b>	$\cosh x$
	<b>S11AAF</b>	$\operatorname{arctanh} x$
	<b>S11ABF</b>	$\operatorname{arcsinh} x$
	<b>S11ACF</b>	$\operatorname{arccosh} x$
<b>C5</b>	Exponential and logarithmic integrals	
	<b>S13AAF</b>	Exponential integral $E_1(x)$
<b>C6</b>	Cosine and sine integrals	
	<b>S13ACF</b>	Cosine integral $\operatorname{Ci}(x)$
	<b>S13ADF</b>	Sine integral $\operatorname{Si}(x)$
<b>C7</b>	Gamma	
<b>C7a</b>	Gamma, log gamma, reciprocal gamma	
	<b>S14AAF</b>	Gamma function
	<b>S14ABF</b>	Log Gamma function
<b>C7c</b>	Psi function	
	<b>S14ACF</b>	$\psi(x) - \ln x$
	<b>S14ADF</b>	Scaled derivatives of $\psi(x)$
<b>C7e</b>	Incomplete gamma	
	<b>S14BAF</b>	Incomplete Gamma functions $P(a, x)$ and $Q(a, x)$
<b>C8</b>	Error functions	
<b>C8a</b>	Error functions, their inverses, integrals, including the normal distribution function	
	<b>S15ABF</b>	Cumulative normal distribution function $P(x)$
	<b>S15ACF</b>	Complement of cumulative normal distribution function $Q(x)$
	<b>S15ADF</b>	Complement of error function $\operatorname{erfc}(x)$
	<b>S15AEF</b>	Error function $\operatorname{erf}(x)$
	<b>S15DDF</b>	Scaled complex complement of error function, $\exp(-z^2)\operatorname{erfc}(-iz)$

<b>C8b</b>	Fresnel integrals	
	S20ACF	Fresnel integral $S(x)$
	S20ADF	Fresnel integral $C(x)$
<b>C8c</b>	Dawson's integral	
	S15AFF	Dawson's integral
<b>C10</b>	Bessel functions	
<b>C10a</b>	$J, Y, H_1, H_2$	
<b>C10a1</b>	Real argument, integer order	
	S17ACF	Bessel function $Y_0(x)$
	S17ADF	Bessel function $Y_1(x)$
	S17AEF	Bessel function $J_0(x)$
	S17AFF	Bessel function $J_1(x)$
<b>C10a4</b>	Complex argument, real order	
	S17DCF	Bessel functions $Y_{\nu+a}(z)$ , real $a \geq 0$ , complex $z$ , $\nu = 0, 1, 2, \dots$
	S17DEF	Bessel functions $J_{\nu+a}(z)$ , real $a \geq 0$ , complex $z$ , $\nu = 0, 1, 2, \dots$
	S17DLF	Hankel functions $H_{\nu+a}^{(j)}(z)$ , $j = 1, 2$ , real $a \geq 0$ , complex $z$ , $\nu = 0, 1, 2, \dots$
<b>C10b</b>	$I, K$	
<b>C10b1</b>	Real argument, integer order	
	S18ACF	Modified Bessel function $K_0(x)$
	S18ADF	Modified Bessel function $K_1(x)$
	S18AEF	Modified Bessel function $I_0(x)$
	S18AFF	Modified Bessel function $I_1(x)$
	S18CCF	Modified Bessel function $e^x K_0(x)$
	S18CDF	Modified Bessel function $e^x K_1(x)$
	S18CEF	Modified Bessel function $e^{- x } I_0(x)$
	S18CFF	Modified Bessel function $e^{- x } I_1(x)$
<b>C10b4</b>	Complex argument, real order	
	S18DCF	Modified Bessel functions $K_{\nu+a}(z)$ , real $a \geq 0$ , complex $z$ , $\nu = 0, 1, 2, \dots$
	S18DEF	Modified Bessel functions $I_{\nu+a}(z)$ , real $a \geq 0$ , complex $z$ , $\nu = 0, 1, 2, \dots$
<b>C10c</b>	Kelvin functions	
	S19AAF	Kelvin function ber $x$
	S19ABF	Kelvin function bei $x$
	S19ACF	Kelvin function ker $x$
	S19ADF	Kelvin function kei $x$
<b>C10d</b>	Airy and Scorer functions	
	S17AGF	Airy function Ai( $x$ )
	S17AHF	Airy function Bi( $x$ )
	S17AJF	Airy function Ai'( $x$ )
	S17AKF	Airy function Bi'( $x$ )
	S17DGF	Airy functions Ai( $z$ ) and Ai'( $z$ ), complex $z$
	S17DHF	Airy functions Bi( $z$ ) and Bi'( $z$ ), complex $z$
<b>C13</b>	Jacobian elliptic functions, theta functions	
	S21CAF	Jacobian elliptic functions sn, cn and dn
<b>C14</b>	Elliptic integrals	
	S21BAF	Degenerate symmetrised elliptic integral of 1st kind $R_C(x, y)$
	S21BBF	Symmetrised elliptic integral of 1st kind $R_F(x, y, z)$
	S21BCF	Symmetrised elliptic integral of 2nd kind $R_D(x, y, z)$
	S21BDF	Symmetrised elliptic integral of 3rd kind $R_J(x, y, z, r)$
<b>D</b>	Linear Algebra	
<b>D1</b>	Elementary vector and matrix operations	
<b>D1a</b>	Elementary vector operations	
<b>D1a1</b>	Set to constant	
	F06DBF	Broadcast scalar into integer vector
	F06EVF	(SGTHRZ/DGTHRZ) Gather and set to zero real sparse vector
	F06FBF	Broadcast scalar into real vector
	F06GVF	(CGTHRZ/ZGTHRZ) Gather and set to zero complex sparse vector
	F06HBF	Broadcast scalar into complex vector
<b>D1a2</b>	Minimum and maximum components	
	F06FLF	Elements of real vector with largest and smallest absolute value
	F06JLF	(ISAMAX/IDAMAX) Index, real vector element with largest absolute value
	F06JMF	(ICAMAX/IZAMAX) Index, complex vector element with largest absolute value
	F06KLF	Last non-negligible element of real vector
<b>D1a3</b>	Norm	
<b>D1a3a</b>	$L_1$ (sum of magnitudes)	
	F06EKF	(SASUM/DASUM) Sum absolute values of real vector elements
	F06JKF	(SCASUM/DZASUM) Sum absolute values of complex vector elements
<b>D1a3b</b>	$L_2$ (Euclidean norm)	
	F06BMF	Compute Euclidean norm from scaled form
	F06BNF	Compute square root of $(a^2 + b^2)$ , real $a$ and $b$
	F06EJF	(SNRM2/DNRM2) Compute Euclidean norm of real vector
	F06FJF	Update Euclidean norm of real vector in scaled form

	F06FKF	Compute weighted Euclidean norm of real vector
	F06JFF	(SCNRM2/DZNRM2) Compute Euclidean norm of complex vector
	F06KJF	Update Euclidean norm of complex vector in scaled form
<b>D1a3c</b>	$L_\infty$ (maximum magnitude)	
	F06FLF	Elements of real vector with largest and smallest absolute value
	F06JLF	(ISAMAX/IDAMAX) Index, real vector element with largest absolute value
	F06JMF	(ICAMAX/IZAMAX) Index, complex vector element with largest absolute value
<b>D1a4</b>	Dot product (inner product)	
	F06EAF	(SDOT/DDOT) Dot product of two real vectors
	F06ERF	(SDOTI/DDOTI) Dot product of two real sparse vectors
	F06GAF	(CDOTU/ZDOTU) Dot product of two complex vectors, unconjugated
	F06GBF	(CDOTC/ZDOTC) Dot product of two complex vectors, conjugated
	F06GRF	(CDOTUI/ZDOTUI) Dot product of two complex sparse vector, unconjugated
	F06GSF	(CDOTCI/ZDOTCI) Dot product of two complex sparse vector, conjugated
	X03AAF	Real inner product added to initial value, basic/additional precision
	X03ABF	Complex inner product added to initial value, basic/additional precision
<b>D1a5</b>	Copy or exchange (swap)	
	F06DFF	Copy integer vector
	F06EFF	(SCOPY/DCOPY) Copy real vector
	F06EGF	(SSWAP/DSWAP) Swap two real vectors
	F06GFF	(CCOPY/ZCOPY) Copy complex vector
	F06GGF	(CSWAP/ZSWAP) Swap two complex vectors
	F06KFF	Copy real vector to complex vector
<b>D1a6</b>	Multiplication by scalar	
	F06EDF	(SSCAL/DSCAL) Multiply real vector by scalar
	F06FDF	Multiply real vector by scalar, preserving input vector
	F06FGF	Negate real vector
	F06GDF	(CSCAL/ZSCAL) Multiply complex vector by complex scalar
	F06HDF	Multiply complex vector by complex scalar, preserving input vector
	F06HGF	Negate complex vector
	F06JDF	(CSSCAL/ZDSCAL) Multiply complex vector by real scalar
	F06KDF	Multiply complex vector by real scalar, preserving input vector
<b>D1a7</b>	Triad ( $\alpha x + y$ for vectors $x, y$ and scalar $\alpha$ )	
	F06ECF	(SAXPY/DAXPY) Add scalar times real vector to real vector
	F06ETF	(SAXPYI/DAXPYI) Add scalar times real sparse vector to real sparse vector
	F06GCF	(CAXPY/ZAXPY) Add scalar times complex vector to complex vector
	F06GTF	(CAXPYI/ZAXPYI) Add scalar times complex sparse vector to complex sparse vector
<b>D1a8</b>	Elementary rotation (Givens transformation)	
	F06AAF	(SROTG/DROTG) Generate real plane rotation
	F06BAF	Generate real plane rotation, storing tangent
	F06BEF	Generate real Jacobi plane rotation
	F06BHF	Apply real similarity rotation to 2 by 2 symmetric matrix
	F06CAF	Generate complex plane rotation, storing tangent, real cosine
	F06CBF	Generate complex plane rotation, storing tangent, real sine
	F06CHF	Apply complex similarity rotation to 2 by 2 Hermitian matrix
	F06EPF	(SROT/DROT) Apply real plane rotation
	F06EXF	(SROTI/DROTI) Apply plane rotation to two real sparse vectors
	F06FPF	Apply real symmetric plane rotation to two vectors
	F06FQF	Generate sequence of real plane rotations
	F06HPF	Apply complex plane rotation
	F06HQF	Generate sequence of complex plane rotations
	F06KPF	Apply real plane rotation to two complex vectors
<b>D1a9</b>	Elementary reflection (Householder transformation)	
	F06FRF	Generate real elementary reflection, NAG style
	F06FSF	Generate real elementary reflection, LINPACK style
	F06FTF	Apply real elementary reflection, NAG style
	F06FUF	Apply real elementary reflection, LINPACK style
	F06HRF	Generate complex elementary reflection
	F06HTF	Apply complex elementary reflection
<b>D1a10</b>	Convolutions	
	C06EKF	Circular convolution or correlation of two real vectors, no extra workspace
	C06FKF	Circular convolution or correlation of two real vectors, extra workspace for greater speed
	C06PKF	Circular convolution or correlation of two complex vectors
	C06PKF	Circular convolution or correlation of two complex vectors
<b>D1a11</b>	Other vector operations	
	F06EUF	(SGTHR/DGTHR) Gather real sparse vector
	F06EVF	(SGTHRZ/DGTHRZ) Gather and set to zero real sparse vector
	F06EWF	(SSCTR/DSCTR) Scatter real sparse vector
	F06FAF	Compute cosine of angle between two real vectors

	F06GUF	(CGTHR/ZGTHR) Gather complex sparse vector
	F06GVF	(CGTHRZ/ZGTHRZ) Gather and set to zero complex sparse vector
	F06GWF	(CSCTR/ZSCTR) Scatter complex sparse vector
	F06KLF	Last non-negligible element of real vector
<b>D1b</b>	Elementary matrix operations	
	F06QJF	Permute rows or columns, real rectangular matrix, permutations represented by an integer array
	F06QKF	Permute rows or columns, real rectangular matrix, permutations represented by a real array
	F06VJF	Permute rows or columns, complex rectangular matrix, permutations represented by an integer array
	F06VKF	Permute rows or columns, complex rectangular matrix, permutations represented by a real array
<b>D1b1</b>	Initialize (e.g., to zero or identity)	
	F06QHF	Matrix initialisation, real rectangular matrix
	F06THF	Matrix initialisation, complex rectangular matrix
<b>D1b2</b>	Norm	
	F04YCF	Norm estimation (for use in condition estimation), real matrix
	F04ZCF	Norm estimation (for use in condition estimation), complex matrix
	F06RAF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real general matrix
	F06REF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real band matrix
	F06RCF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real symmetric matrix
	F06RDF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real symmetric matrix, packed storage
	F06REF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real symmetric band matrix
	F06RJF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real trapezoidal/triangular matrix
	F06RKF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real triangular matrix, packed storage
	F06RLF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real triangular band matrix
	F06RMF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, real Hessenberg matrix
	F06UAF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex general matrix
	F06UBF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex band matrix
	F06UCF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex Hermitian matrix
	F06UDF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex Hermitian matrix, packed storage
	F06UEF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex Hermitian band matrix
	F06UFF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex symmetric matrix
	F06UGF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex symmetric matrix, packed storage
	F06UHF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex symmetric band matrix
	F06UJF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex trapezoidal/triangular matrix
	F06UKF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex triangular matrix, packed storage
	F06ULF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex triangular band matrix
	F06UMF	1-norm, $\infty$ -norm, Frobenius norm, largest absolute element, complex Hessenberg matrix
<b>D1b3</b>	Transpose	
	F01CRF	Matrix transposition
	F01CTF	Sum or difference of two real matrices, optional scaling and transposition
	F01CWF	Sum or difference of two complex matrices, optional scaling and transposition
<b>D1b4</b>	Multiplication by vector	
	F06HCF	Multiply complex vector by complex diagonal matrix
	F06KCF	Multiply complex vector by real diagonal matrix
	F06PAF	(SGEMV/DGEMV) Matrix-vector product, real rectangular matrix
	F06PBF	(SGBMV/DGBMV) Matrix-vector product, real rectangular band matrix
	F06PCF	(SSYMV/DSYMV) Matrix-vector product, real symmetric matrix
	F06PDF	(SSBMV/DSBMV) Matrix-vector product, real symmetric band matrix
	F06PEF	(SSPMV/DSPMV) Matrix-vector product, real symmetric packed matrix
	F06PFF	(STRMV/DTRMV) Matrix-vector product, real triangular matrix
	F06PGF	(STBMV/DTBMV) Matrix-vector product, real triangular band matrix
	F06PHF	(STPMV/DTPMV) Matrix-vector product, real triangular packed matrix
	F06SAF	(CGEMV/ZGEMV) Matrix-vector product, complex rectangular matrix
	F06SBF	(CGBMV/ZGBMV) Matrix-vector product, complex rectangular band matrix

	F06SCF	(CHEMV/ZHEMV) Matrix-vector product, complex Hermitian matrix
	F06SDF	(CHBMV/ZHBMV) Matrix-vector product, complex Hermitian band matrix
	F06SEF	(CHPMV/ZHPMV) Matrix-vector product, complex Hermitian packed matrix
	F06SFF	(CTRMV/ZTRMV) Matrix-vector product, complex triangular matrix
	F06SGF	(CTBMV/ZTBMV) Matrix-vector product, complex triangular band matrix
	F06SHF	(CTPMV/ZTPMV) Matrix-vector product, complex triangular packed matrix
	F11XAF	Real sparse nonsymmetric matrix vector multiply
	F11XEF	Real sparse symmetric matrix vector multiply
	F11XNF	Complex sparse non-Hermitian matrix vector multiply
	F11XSF	Complex sparse Hermitian matrix vector multiply
<b>D1b5</b>	Addition, subtraction	
	F01CTF	Sum or difference of two real matrices, optional scaling and transposition
	F01CWF	Sum or difference of two complex matrices, optional scaling and transposition
	F06PMF	(SGER/DGER) Rank-1 update, real rectangular matrix
	F06PPF	(SSYR/DSYR) Rank-1 update, real symmetric matrix
	F06PQF	(SSPR/DSPR) Rank-1 update, real symmetric packed matrix
	F06PRF	(SSYR2/DSYR2) Rank-2 update, real symmetric matrix
	F06PSF	(SSPR2/DSPR2) Rank-2 update, real symmetric packed matrix
	F06SMF	(CGERU/ZGERU) Rank-1 update, complex rectangular matrix, unconjugated vector
	F06SNF	(CGERC/ZGERC) Rank-1 update, complex rectangular matrix, conjugated vector
	F06SFF	(CHER/ZHER) Rank-1 update, complex Hermitian matrix
	F06SQF	(CHPR/ZHPR) Rank-1 update, complex Hermitian packed matrix
	F06SRF	(CHER2/ZHER2) Rank-2 update, complex Hermitian matrix
	F06SSF	(CHPR2/ZHPR2) Rank-2 update, complex Hermitian packed matrix
	F06YPF	(SSYRK/DSYRK) Rank- $k$ update of real symmetric matrix
	F06ZPF	(CHERK/ZHERK) Rank- $k$ update of complex Hermitian matrix
	F06ZRF	(CHER2K/ZHER2K) Rank- $2k$ update of complex Hermitian matrix
	F06ZUF	(CSYRK/ZSYRK) Rank- $k$ update of complex symmetric matrix
	F06ZWF	(CSYR2K/ZHER2K) Rank- $2k$ update of complex symmetric matrix
<b>D1b6</b>	Multiplication	
	F01CKF	Matrix multiplication
	F06FCF	Multiply real vector by diagonal matrix
	F06YAF	(SGEMM/DGEMM) Matrix-matrix product, two real rectangular matrices
	F06YCF	(SSYMM/DSYMM) Matrix-matrix product, one real symmetric matrix, one real rectangular matrix
	F06YFF	(STRMM/DTRMM) Matrix-matrix product, one real triangular matrix, one real rectangular matrix
	F06YRF	(SSYR2K/DSYR2K) Rank- $2k$ update of real symmetric matrix
	F06ZAF	(CGEMM/ZGEMM) Matrix-matrix product, two complex rectangular matrices
	F06ZCF	(CHEMM/ZHEMM) Matrix-matrix product, one complex Hermitian matrix, one complex rectangular matrix
	F06ZFF	(CTRMM/ZTRMM) Matrix-matrix product, one complex triangular matrix, one complex rectangular matrix
	F06ZTF	(CSYMM/ZSYMM) Matrix-matrix product, one complex symmetric matrix, one complex rectangular matrix
<b>D1b8</b>	Copy	
	F06QFF	Matrix copy, real rectangular or trapezoidal matrix
	F06TFF	Matrix copy, complex rectangular or trapezoidal matrix
<b>D1b9</b>	Storage mode conversion	
	F01ZAF	Convert real matrix between packed triangular and square storage schemes
	F01ZBF	Convert complex matrix between packed triangular and square storage schemes
	F01ZCF	Convert real matrix between packed banded and rectangular storage schemes
	F01ZDF	Convert complex matrix between packed banded and rectangular storage schemes
	F11ZAF	Real sparse nonsymmetric matrix reorder routine
	F11ZBF	Real sparse symmetric matrix reorder routine
	F11ZPF	Complex sparse Hermitian matrix reorder routine
	F11ZNF	Complex sparse non-Hermitian matrix reorder routine
<b>D1b10</b>	Elementary rotation (Givens transformation)	
	F06QMF	Orthogonal similarity transformation of real symmetric matrix as a sequence of plane rotations
	F06QVF	Compute upper Hessenberg matrix by sequence of plane rotations, real upper triangular matrix
	F06QWF	Compute upper spiked matrix by sequence of plane rotations, real upper triangular matrix
	F06QXF	Apply sequence of plane rotations, real rectangular matrix
	F06TMF	Unitary similarity transformation of Hermitian matrix as a sequence of plane rotations
	F06TVF	Compute upper Hessenberg matrix by sequence of plane rotations, complex upper triangular matrix
	F06TWF	Compute upper spiked matrix by sequence of plane rotations, complex upper triangular matrix

		F06TXF	Apply sequence of plane rotations, complex rectangular matrix, real cosine and complex sine
		F06TYF	Apply sequence of plane rotations, complex rectangular matrix, complex cosine and real sine
		F06VXF	Apply sequence of plane rotations, complex rectangular matrix, real cosine and sine
<b>D2</b>	Solution of systems of linear equations (including inversion, <i>LU</i> and related decompositions)		
<b>D2a</b>	Real nonsymmetric matrices		
<b>D2a1</b>	General		
		F03AFF	<i>LU</i> factorization and determinant of real matrix
		F04AAF	Solution of real simultaneous linear equations with multiple right-hand sides (Black Box)
		F04AEF	Solution of real simultaneous linear equations with multiple right-hand sides using iterative refinement (Black Box)
		F04AHF	Solution of real simultaneous linear equations using iterative refinement (coefficient matrix already factorized by F03AFF)
		F04AJF	Solution of real simultaneous linear equations (coefficient matrix already factorized by F03AFF)
		F04ARF	Solution of real simultaneous linear equations, one right-hand side (Black Box)
		F04ATF	Solution of real simultaneous linear equations, one right-hand side using iterative refinement (Black Box)
		F07ADF	(SGETRF/DGETRF) <i>LU</i> factorization of real $m$ by $n$ matrix
		F07AEF	(SGETRS/DGETRS) Solution of real system of linear equations, multiple right-hand sides, matrix already factorized by F07ADF
		F07AGF	(SGECON/DGECON) Estimate condition number of real matrix, matrix already factorized by F07ADF
		F07AHF	(SGERFS/DGERFS) Refined solution with error bounds of real system of linear equations, multiple right-hand sides
		F07AJF	(SGETRI/DGETRI) Inverse of real matrix, matrix already factorized by F07ADF
<b>D2a2</b>	Banded		
		F01LHF	<i>LU</i> factorization of real almost block diagonal matrix
		F04LHF	Solution of real almost block diagonal simultaneous linear equations (coefficient matrix already factorized by F01LHF)
		F07BDF	(SGBTRF/DGBTRF) <i>LU</i> factorization of real $m$ by $n$ band matrix
		F07BEF	(SGBTRS/DGBTRS) Solution of real band system of linear equations, multiple right-hand sides, matrix already factorized by F07BDF
		F07BGF	(SGBCON/DGBCON) Estimate condition number of real band matrix, matrix already factorized by F07BDF
		F07BHF	(SGBRFS/DGBRFS) Refined solution with error bounds of real band system of linear equations, multiple right-hand sides
		F07VEF	(STBTRS/DTBTRS) Solution of real band triangular system of linear equations, multiple right-hand sides
		F07VGF	(STBCON/DTBCON) Estimate condition number of real band triangular matrix
		F07VHF	(STBRFS/DTBRFS) Error bounds for solution of real band triangular system of linear equations, multiple right-hand sides
<b>D2a2a</b>	Tridiagonal		
		F01LEF	<i>LU</i> factorization of real tridiagonal matrix
		F04EAF	Solution of real tridiagonal simultaneous linear equations, one right-hand side (Black Box)
		F04LEF	Solution of real tridiagonal simultaneous linear equations (coefficient matrix already factorized by F01LEF)
<b>D2a3</b>	Triangular		
		F06PJF	(STRSV/DTRSV) System of equations, real triangular matrix
		F06PKF	(STBSV/DTBSV) System of equations, real triangular band matrix
		F06PLF	(STPSV/DTPSV) System of equations, real triangular packed matrix
		F06YJF	(STRSM/DTRSM) Solves system of equations with multiple right-hand sides, real triangular coefficient matrix
		F07TEF	(STRTRS/DTRTRS) Solution of real triangular system of linear equations, multiple right-hand sides
		F07TGF	(STRCON/DTRCON) Estimate condition number of real triangular matrix
		F07THF	(STRRFS/DTRRFS) Error bounds for solution of real triangular system of linear equations, multiple right-hand sides
		F07TJF	(STRTRI/DTRTRI) Inverse of real triangular matrix
		F07UEF	(STPTRS/DTPTRS) Solution of real triangular system of linear equations, multiple right-hand sides, packed storage
		F07UGF	(STPCON/DTPCON) Estimate condition number of real triangular matrix, packed storage
		F07UHF	(STPRFS/DTPRFS) Error bounds for solution of real triangular system of linear equations, multiple right-hand sides, packed storage
		F07UJF	(STPTRI/DTPTRI) Inverse of real triangular matrix, packed storage
		F07VEF	(STBTRS/DTBTRS) Solution of real band triangular system of linear equations, multiple right-hand sides
		F07VGF	(STBCON/DTBCON) Estimate condition number of real band triangular matrix

		F07VHF	(STBRFS/DTBRFS) Error bounds for solution of real band triangular system of linear equations, multiple right-hand sides
<b>D2a4</b>	Sparse	F01BRF	<i>LU</i> factorization of real sparse matrix
		F01BSF	<i>LU</i> factorization of real sparse matrix with known sparsity pattern
		F04AXF	Solution of real sparse simultaneous linear equations (coefficient matrix already factorized)
		F04QAF	Sparse linear least-squares problem, $m$ real equations in $n$ unknowns
		F11BAF	Real sparse nonsymmetric linear systems, set-up for F11BBF
		F11BBF	Real sparse nonsymmetric linear systems, preconditioned RGMRES, CGS or Bi-CGSTAB
		F11BCF	Real sparse nonsymmetric linear systems, diagnostic for F11BBF
		F11BDF	Real sparse nonsymmetric linear systems, set-up for F11BEF
		F11BEF	Real sparse nonsymmetric linear systems, preconditioned RGMRES, CGS, Bi-CGSTAB or TFQMR method
		F11BFF	Real sparse nonsymmetric linear systems, diagnostic for F11BEF
		F11BRF	Complex sparse non-Hermitian linear systems, set-up for F11BSF
		F11BSF	Complex sparse non-Hermitian linear systems, preconditioned RGMRES, CGS, Bi-CGSTAB or TFQMR method
		F11BTF	Complex sparse non-Hermitian linear systems, diagnostic for F11BSF
		F11DAF	Real sparse nonsymmetric linear systems, incomplete <i>LU</i> factorization
		F11DBF	Solution of linear system involving incomplete <i>LU</i> preconditioning matrix generated by F11DAF
		F11DCF	Solution of real sparse nonsymmetric linear system, RGMRES, CGS or Bi-CGSTAB method, preconditioner computed by F11DAF (Black Box)
		F11DDF	Solution of linear system involving preconditioning matrix generated by applying SSOR to real sparse nonsymmetric matrix
		F11DEF	Solution of real sparse nonsymmetric linear system, RGMRES, CGS or Bi-CGSTAB method, Jacobi or SSOR preconditioner (Black Box)
<b>D2b</b>	Real symmetric matrices		
<b>D2b1</b>	General		
<b>D2b1a</b>	Indefinite	F07MDF	(SSYTRF/DSYTRF) Bunch–Kaufman factorization of real symmetric indefinite matrix
		F07MEF	(SSYTRS/DSYTRS) Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07MDF
		F07MGF	(SSYCON/DSYCON) Estimate condition number of real symmetric indefinite matrix, matrix already factorized by F07MDF
		F07MHF	(SSYRFS/DSYRFS) Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides
		F07MJF	(SSYTRI/DSYTRI) Inverse of real symmetric indefinite matrix, matrix already factorized by F07MDF
		F07PDF	(SSPTRF/DSPTRF) Bunch–Kaufman factorization of real symmetric indefinite matrix, packed storage
		F07PEF	(SSPTRS/DSPTRS) Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07PDF, packed storage
		F07PGF	(SSPCON/DSPCON) Estimate condition number of real symmetric indefinite matrix, matrix already factorized by F07PDF, packed storage
		F07PHF	(SSPRFS/DSPRFS) Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides, packed storage
		F07PJF	(SSPTRI/DSPTRI) Inverse of real symmetric indefinite matrix, matrix already factorized by F07PDF, packed storage
<b>D2b1b</b>	Positive-definite	F01ABF	Inverse of real symmetric positive-definite matrix using iterative refinement
		F01ADF	Inverse of real symmetric positive-definite matrix
		F01BUF	<i>ULDL<sup>T</sup>U<sup>T</sup></i> factorization of real symmetric positive-definite band matrix
		F03AEF	<i>LL<sup>T</sup></i> factorization and determinant of real symmetric positive-definite matrix
		F04ABF	Solution of real symmetric positive-definite simultaneous linear equations with multiple right-hand sides using iterative refinement (Black Box)
		F04AFF	Solution of real symmetric positive-definite simultaneous linear equations using iterative refinement (coefficient matrix already factorized by F03AEF)
		F04AGF	Solution of real symmetric positive-definite simultaneous linear equations (coefficient matrix already factorized by F03AEF)
		F04ASF	Solution of real symmetric positive-definite simultaneous linear equations, one right-hand side using iterative refinement (Black Box)
		F04FEF	Solution of the Yule–Walker equations for real symmetric positive-definite Toeplitz matrix, one right-hand side
		F04FFF	Solution of real symmetric positive-definite Toeplitz system, one right-hand side
		F04MEF	Update solution of the Yule–Walker equations for real symmetric positive-definite Toeplitz matrix
		F04MFF	Update solution of real symmetric positive-definite Toeplitz system

	F07FDF	(SPOTRF/DPOTRF) Cholesky factorization of real symmetric positive-definite matrix
	F07FEF	(SPOTRS/DPOTRS) Solution of real symmetric positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07FDF
	F07FGF	(SPOCON/DPOCON) Estimate condition number of real symmetric positive-definite matrix, matrix already factorized by F07FDF
	F07FHF	(SPORFS/DPORFS) Refined solution with error bounds of real symmetric positive-definite system of linear equations, multiple right-hand sides
	F07FJF	(SPOTRI/DPOTRI) Inverse of real symmetric positive-definite matrix, matrix already factorized by F07FDF
	F07GDF	(SPPTRF/DPPTRF) Cholesky factorization of real symmetric positive-definite matrix, packed storage
	F07GEF	(SPPTRS/DPPTRS) Solution of real symmetric positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07GDF, packed storage
	F07GGF	(SPPCON/DPPCON) Estimate condition number of real symmetric positive-definite matrix, matrix already factorized by F07GDF, packed storage
	F07GHF	(SPPRFS/DPPRFS) Refined solution with error bounds of real symmetric positive-definite system of linear equations, multiple right-hand sides, packed storage
	F07GJF	(SPPTRI/DPPTRI) Inverse of real symmetric positive-definite matrix, matrix already factorized by F07GDF, packed storage
<b>D2b2</b>		Positive-definite banded
	F01MCF	$LDL^T$ factorization of real symmetric positive-definite variable-bandwidth matrix
	F04ACF	Solution of real symmetric positive-definite banded simultaneous linear equations with multiple right-hand sides (Black Box)
	F04MCF	Solution of real symmetric positive-definite variable-bandwidth simultaneous linear equations (coefficient matrix already factorized by F01MCF)
	F07HDF	(SPBTRF/DPBTRF) Cholesky factorization of real symmetric positive-definite band matrix
	F07HEF	(SPBTRS/DPBTRS) Solution of real symmetric positive-definite band system of linear equations, multiple right-hand sides, matrix already factorized by F07HDF
	F07HGF	(SPBCON/DPBCON) Estimate condition number of real symmetric positive-definite band matrix, matrix already factorized by F07HDF
	F07HHF	(SPBRFS/DPBRFS) Refined solution with error bounds of real symmetric positive-definite band system of linear equations, multiple right-hand sides
	F08UFF	(SPBSTF/DPBSTF) Computes a split Cholesky factorization of real symmetric positive-definite band matrix $A$
	F08UTF	(CPBSTF/ZPBSTF) Computes a split Cholesky factorization of complex Hermitian positive-definite band matrix $A$
<b>D2b2a</b>		Tridiagonal
	F04FAF	Solution of real symmetric positive-definite tridiagonal simultaneous linear equations, one right-hand side (Black Box)
<b>D2b4</b>		Sparse
	F11GAF	Real sparse symmetric linear systems, set-up for F11GBF
	F11GBF	Real sparse symmetric linear systems, preconditioned conjugate gradient or Lanczos
	F11GCF	Real sparse symmetric linear systems, diagnostic for F11GBF
	F11JAF	Real sparse symmetric matrix, incomplete Cholesky factorization
	F11JBF	Solution of linear system involving incomplete Cholesky preconditioning matrix generated by F11JAF
	F11JCF	Solution of real sparse symmetric linear system, conjugate gradient/Lanczos method, preconditioner computed by F11JAF (Black Box)
	F11JDF	Solution of linear system involving preconditioning matrix generated by applying SSOR to real sparse symmetric matrix
	F11JEF	Solution of real sparse symmetric linear system, conjugate gradient/Lanczos method, Jacobi or SSOR preconditioner (Black Box)
<b>D2c</b>		Complex non-Hermitian matrices
<b>D2c1</b>		General
	F04ADF	Solution of complex simultaneous linear equations with multiple right-hand sides (Black Box)
	F07ARF	(CGETRF/ZGETRF) $LU$ factorization of complex $m$ by $n$ matrix
	F07ASF	(CGETRS/ZGETRS) Solution of complex system of linear equations, multiple right-hand sides, matrix already factorized by F07ARF
	F07AUF	(CGECON/ZGECON) Estimate condition number of complex matrix, matrix already factorized by F07ARF
	F07AVF	(CGERFS/ZGERFS) Refined solution with error bounds of complex system of linear equations, multiple right-hand sides
	F07AWF	(CGETRI/ZGETRI) Inverse of complex matrix, matrix already factorized by F07ARF
	F07NRF	(CSYTRF/ZSYTRF) Bunch–Kaufman factorization of complex symmetric matrix
	F07NSF	(CSYTRS/ZSYTRS) Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by F07NRF
	F07NUF	(CSYCON/ZSYCON) Estimate condition number of complex symmetric matrix, matrix already factorized by F07NRF

		F07NVF	(CSYRFS/ZSYRFS) Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides
		F07NWF	(CSYTRI/ZSYTRI) Inverse of complex symmetric matrix, matrix already factorized by F07NRF
		F07QRF	(CSPTRF/ZSPTRF) Bunch–Kaufman factorization of complex symmetric matrix, packed storage
		F07QSF	(CSPTRS/ZSPTRS) Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by F07QRF, packed storage
		F07QUF	(CSPCON/ZSPCON) Estimate condition number of complex symmetric matrix, matrix already factorized by F07QRF, packed storage
		F07QVF	(CSPRFS/ZSPRFS) Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides, packed storage
		F07QWF	(CSPTRI/ZSPTRI) Inverse of complex symmetric matrix, matrix already factorized by F07QRF, packed storage
<b>D2c2</b>	Banded	F07BRF	(CGBTRF/ZGBTRF) <i>LU</i> factorization of complex $m$ by $n$ band matrix
		F07BSF	(CGBTRS/ZGBTRS) Solution of complex band system of linear equations, multiple right-hand sides, matrix already factorized by F07BRF
		F07BUF	(CGBCON/ZGBCON) Estimate condition number of complex band matrix, matrix already factorized by F07BRF
		F07BVF	(CGBRFS/ZGBRFS) Refined solution with error bounds of complex band system of linear equations, multiple right-hand sides
		F07VSF	(CTBTRS/ZTBTRS) Solution of complex band triangular system of linear equations, multiple right-hand sides
		F07VUF	(CTBCON/ZTBCON) Estimate condition number of complex band triangular matrix
		F07VVF	(CTBRFS/ZTBRFS) Error bounds for solution of complex band triangular system of linear equations, multiple right-hand sides
<b>D2c3</b>	Triangular	F06SJF	(CTRSV/ZTRSV) System of equations, complex triangular matrix
		F06SKF	(CTBSV/ZTBSV) System of equations, complex triangular band matrix
		F06SLF	(CTPSV/ZTPSV) System of equations, complex triangular packed matrix
		F06ZJF	(CTRSM/ZTRSM) Solves system of equations with multiple right-hand sides, complex triangular coefficient matrix
		F07TSF	(CTRTRS/ZTRTRS) Solution of complex triangular system of linear equations, multiple right-hand sides
		F07TUF	(CTRCON/ZTRCON) Estimate condition number of complex triangular matrix
		F07TVF	(CTRRFS/ZTRRFS) Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides
		F07TWF	(CTRTRI/ZTRTRI) Inverse of complex triangular matrix
		F07USF	(CTPTRS/ZTPTRS) Solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
		F07UUF	(CTPCON/ZTPCON) Estimate condition number of complex triangular matrix, packed storage
		F07UVF	(CTPRFS/ZTPRFS) Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
		F07UWF	(CTPTRI/ZTPTRI) Inverse of complex triangular matrix, packed storage
		F07VSF	(CTBTRS/ZTBTRS) Solution of complex band triangular system of linear equations, multiple right-hand sides
		F07VUF	(CTBCON/ZTBCON) Estimate condition number of complex band triangular matrix
		F07VVF	(CTBRFS/ZTBRFS) Error bounds for solution of complex band triangular system of linear equations, multiple right-hand sides
<b>D2c4</b>	Sparse	F11DNF	Complex sparse non-Hermitian linear systems, incomplete <i>LU</i> factorization
		F11DPF	Solution of complex linear system involving incomplete <i>LU</i> preconditioning matrix generated by F11DNF
		F11DQF	Solution of complex sparse non-Hermitian linear system, RGMRES, CGS, Bi-CGSTAB or TFQMR method, preconditioner computed by F11DNF (Black Box)
		F11DRF	Solution of linear system involving preconditioning matrix generated by applying SSOR to complex sparse non-Hermitian matrix
		F11DSF	Solution of complex sparse non-Hermitian linear system, RGMRES, CGS, Bi-CGSTAB or TFQMR method, Jacobi or SSOR preconditioner (Black Box)
<b>D2d</b>	Complex Hermitian matrices		
<b>D2d1</b>	General		
<b>D2d1a</b>	Indefinite	F07MRF	(CHETRF/ZHETRF) Bunch–Kaufman factorization of complex Hermitian indefinite matrix
		F07MSF	(CHETRS/ZHETRS) Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07MRF
		F07MUF	(CHECON/ZHECON) Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by F07MRF

		F07MVF	(CHERFS/ZHERFS) Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides
		F07MWF	(CHETRI/ZHETRI) Inverse of complex Hermitian indefinite matrix, matrix already factorized by F07MRF
		F07PRF	(CHPTRF/ZHPTRF) Bunch–Kaufman factorization of complex Hermitian indefinite matrix, packed storage
		F07PSF	(CHPTRS/ZHPTRS) Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07PRF, packed storage
		F07PUF	(CHPCON/ZHPCON) Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by F07PRF, packed storage
		F07PVF	(CHPRFS/ZHPRFS) Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides, packed storage
		F07PWF	(CHPTRI/ZHPTRI) Inverse of complex Hermitian indefinite matrix, matrix already factorized by F07PRF, packed storage
<b>D2d1b</b>	Positive-definite	F07FRF	(CPOTRF/ZPOTRF) Cholesky factorization of complex Hermitian positive-definite matrix
		F07FSF	(CPOTRS/ZPOTRS) Solution of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07FRF
		F07FUF	(CPOCON/ZPOCON) Estimate condition number of complex Hermitian positive-definite matrix, matrix already factorized by F07FRF
		F07FVF	(CPORFS/ZPORFS) Refined solution with error bounds of complex Hermitian positive-definite system of linear equations, multiple right-hand sides
		F07FWF	(CPOTRI/ZPOTRI) Inverse of complex Hermitian positive-definite matrix, matrix already factorized by F07FRF
		F07GRF	(CPPTRF/ZPPTRF) Cholesky factorization of complex Hermitian positive-definite matrix, packed storage
		F07GSF	(CPPTRS/ZPPTRS) Solution of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07GRF, packed storage
		F07GUF	(CPPCON/ZPPCON) Estimate condition number of complex Hermitian positive-definite matrix, matrix already factorized by F07GRF, packed storage
		F07GVF	(CPPRFS/ZPPRFS) Refined solution with error bounds of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, packed storage
		F07GWF	(CPPTRI/ZPPTRI) Inverse of complex Hermitian positive-definite matrix, matrix already factorized by F07GRF, packed storage
<b>D2d2</b>	Positive-definite banded	F07HRF	(CPBTRF/ZPBTRF) Cholesky factorization of complex Hermitian positive-definite band matrix
		F07HSF	(CPBTRS/ZPBTRS) Solution of complex Hermitian positive-definite band system of linear equations, multiple right-hand sides, matrix already factorized by F07HRF
		F07HUF	(CPBCON/ZPBCON) Estimate condition number of complex Hermitian positive-definite band matrix, matrix already factorized by F07HRF
		F07HVF	(CPBRFS/ZPBRFS) Refined solution with error bounds of complex Hermitian positive-definite band system of linear equations, multiple right-hand sides
<b>D2d4</b>	Sparse	F11JNF	Complex sparse Hermitian matrix, incomplete Cholesky factorization
		F11JPF	Solution of complex linear system involving incomplete Cholesky preconditioning matrix generated by F11JNF
		F11JQF	Solution of complex sparse Hermitian linear system, conjugate gradient/Lanczos method, preconditioner computed by F11JNF (Black Box)
		F11JRF	Solution of linear system involving preconditioning matrix generated by applying SSOR to complex sparse Hermitian matrix
		F11JSF	Solution of complex sparse Hermitian linear system, conjugate gradient/Lanczos method, Jacobi or SSOR preconditioner (Black Box)
<b>D2e</b>	Associated operations (e.g., matrix reorderings)	F11XAF	Real sparse nonsymmetric matrix vector multiply
		F11XEF	Real sparse symmetric matrix vector multiply
		F11XNF	Complex sparse non-Hermitian matrix vector multiply
		F11XSF	Complex sparse Hermitian matrix vector multiply
		F11ZAF	Real sparse nonsymmetric matrix reorder routine
		F11ZBF	Real sparse symmetric matrix reorder routine
		F11ZNF	Complex sparse non-Hermitian matrix reorder routine
		F11ZPF	Complex sparse Hermitian matrix reorder routine
<b>D3</b>	Determinants		
<b>D3a</b>	Real nonsymmetric matrices		
<b>D3a1</b>	General	F03AAF	Determinant of real matrix (Black Box)
		F03AFF	<i>LU</i> factorization and determinant of real matrix
<b>D3b</b>	Real symmetric matrices		
<b>D3b1</b>	General		

<b>D3b1b</b>	Positive-definite	
	F03ABF	Determinant of real symmetric positive-definite matrix (Black Box)
	F03AEF	$LL^T$ factorization and determinant of real symmetric positive-definite matrix
<b>D3b2</b>	Positive-definite banded	
	F03ACF	Determinant of real symmetric positive-definite band matrix (Black Box)
<b>D3c</b>	Complex non-Hermitian matrices	
<b>D3c1</b>	General	
	F03ADF	Determinant of complex matrix (Black Box)
<b>D4</b>	Eigenvalues, eigenvectors	
<b>D4a</b>	Ordinary eigenvalue problems ( $Ax = \lambda x$ )	
<b>D4a1</b>	Real symmetric	
	F02FAF	All eigenvalues and eigenvectors of real symmetric matrix (Black Box)
	F02FCF	Selected eigenvalues and eigenvectors of real symmetric matrix (Black Box)
	F06BPF	Compute eigenvalue of 2 by 2 real symmetric matrix
	F08FCF	(SSYEVD/DSYEVD) All eigenvalues and optionally all eigenvectors of real symmetric matrix, using divide and conquer
	F08GCF	(SSPEVD/DSPEVD) All eigenvalues and optionally all eigenvectors of real symmetric matrix, packed storage, using divide and conquer
	F08HCF	(SSBEVD/DSBEVD) All eigenvalues and optionally all eigenvectors of real symmetric band matrix, using divide and conquer
<b>D4a2</b>	Real nonsymmetric	
	F02EAF	All eigenvalues and Schur factorization of real general matrix (Black Box)
	F02EBF	All eigenvalues and eigenvectors of real general matrix (Black Box)
	F02ECF	Selected eigenvalues and eigenvectors of real nonsymmetric matrix (Black Box)
<b>D4a3</b>	Complex Hermitian	
	F02HAF	All eigenvalues and eigenvectors of complex Hermitian matrix (Black Box)
	F02HCF	Selected eigenvalues and eigenvectors of complex Hermitian matrix (Black Box)
	F08FQF	(CHEEVD/ZHEEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian matrix, using divide and conquer
	F08GQF	(CHPEVD/ZHPEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian matrix, packed storage, using divide and conquer
	F08HQF	(CHBEVD/ZHBEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian band matrix, using divide and conquer
<b>D4a4</b>	Complex non-Hermitian	
	F02GAF	All eigenvalues and Schur factorization of complex general matrix (Black Box)
	F02GBF	All eigenvalues and eigenvectors of complex general matrix (Black Box)
	F02GCF	Selected eigenvalues and eigenvectors of complex nonsymmetric matrix (Black Box)
<b>D4a5</b>	Tridiagonal	
	F08JCF	(SSTEVD/DSTEVD) All eigenvalues and optionally all eigenvectors of real symmetric tridiagonal matrix, using divide and conquer
	F08JEF	(SSTEQR/DSTEQR) All eigenvalues and eigenvectors of real symmetric tridiagonal matrix, reduced from real symmetric matrix using implicit $QL$ or $QR$
	F08JFF	(SSTERF/DSTERF) All eigenvalues of real symmetric tridiagonal matrix, root-free variant of $QL$ or $QR$
	F08JGF	(SPTEQR/DPTEQR) All eigenvalues and eigenvectors of real symmetric positive-definite tridiagonal matrix, reduced from real symmetric positive-definite matrix
	F08JJF	(SSTEBZ/DSTEBZ) Selected eigenvalues of real symmetric tridiagonal matrix by bisection
	F08JKF	(SSTEIN/DSTEIN) Selected eigenvectors of real symmetric tridiagonal matrix by inverse iteration, storing eigenvectors in real array
<b>D4a6</b>	Banded	
	F08HCF	(SSBEVD/DSBEVD) All eigenvalues and optionally all eigenvectors of real symmetric band matrix, using divide and conquer
	F08HQF	(CHBEVD/ZHBEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian band matrix, using divide and conquer
<b>D4a7</b>	Sparse	
	F02FJF	Selected eigenvalues and eigenvectors of sparse symmetric eigenproblem (Black Box)
<b>D4b</b>	Generalized eigenvalue problems (e.g., $Ax = \lambda Bx$ )	
<b>D4b1</b>	Real symmetric	
	F02FDF	All eigenvalues and eigenvectors of real symmetric-definite generalized problem (Black Box)
	F02FJF	Selected eigenvalues and eigenvectors of sparse symmetric eigenproblem (Black Box)
<b>D4b2</b>	Real general	
	F02BJF	All eigenvalues and optionally eigenvectors of generalized eigenproblem by $QZ$ algorithm, real matrices (Black Box)
<b>D4b3</b>	Complex Hermitian	
	F02HDF	All eigenvalues and eigenvectors of complex Hermitian-definite generalized problem (Black Box)
<b>D4b4</b>	Complex general	
	F02GJF	All eigenvalues and optionally eigenvectors of generalized complex eigenproblem by $QZ$ algorithm (Black Box)
<b>D4b5</b>	Banded	

		F02FHF	All eigenvalues of generalized banded real symmetric-definite eigenproblem (Black Box)
		F02SDF	Eigenvector of generalized real banded eigenproblem by inverse iteration
<b>D4c</b>	Associated operations	F08QFF	(STREXC/DTREXC) Reorder Schur factorization of real matrix using orthogonal similarity transformation
		F08QGF	(STRSEN/DTRSEN) Reorder Schur factorization of real matrix, form orthonormal basis of right invariant subspace for selected eigenvalues, with estimates of sensitivities
		F08QLF	(STRSNA/DTRSNA) Estimates of sensitivities of selected eigenvalues and eigenvectors of real upper quasi-triangular matrix
		F08QTF	(CTREXC/ZTREXC) Reorder Schur factorization of complex matrix using unitary similarity transformation
		F08QUF	(CTRSEN/ZTRSEN) Reorder Schur factorization of complex matrix, form orthonormal basis of right invariant subspace for selected eigenvalues, with estimates of sensitivities
		F08QYF	(CTRSNA/ZTRSNA) Estimates of sensitivities of selected eigenvalues and eigenvectors of complex upper triangular matrix
<b>D4c1</b>	Transform problem		
<b>D4c1a</b>	Balance matrix	F08NHF	(SGEBAL/DGEBAL) Balance real general matrix
		F08NVF	(CGEBAL/ZGEBAL) Balance complex general matrix
<b>D4c1b</b>	Reduce to compact form		
<b>D4c1b1</b>	Tridiagonal	F08FEF	(SSYTRD/DSYTRD) Orthogonal reduction of real symmetric matrix to symmetric tridiagonal form
		F08FFF	(SORGTR/DORGTR) Generate orthogonal transformation matrix from reduction to tridiagonal form determined by F08FEF
		F08FSF	(CHETRD/ZHETRD) Unitary reduction of complex Hermitian matrix to real symmetric tridiagonal form
		F08FTF	(CUNGTR/ZUNGTR) Generate unitary transformation matrix from reduction to tridiagonal form determined by F08FSF
		F08GEF	(SSPTRD/DSPTRD) Orthogonal reduction of real symmetric matrix to symmetric tridiagonal form, packed storage
		F08GFF	(SOPGTR/DOPGTR) Generate orthogonal transformation matrix from reduction to tridiagonal form determined by F08GEF
		F08GSF	(CHPTRD/ZHPTRD) Unitary reduction of complex Hermitian matrix to real symmetric tridiagonal form, packed storage
		F08GTF	(CUPGTR/ZUPGTR) Generate unitary transformation matrix from reduction to tridiagonal form determined by F08GSF
		F08HEF	(SSBTRD/DSBTRD) Orthogonal reduction of real symmetric band matrix to symmetric tridiagonal form
		F08HSF	(CHBTRD/ZHBTRD) Unitary reduction of complex Hermitian band matrix to real symmetric tridiagonal form
<b>D4c1b2</b>	Hessenberg	F08NEF	(SGEHRD/DGEHRD) Orthogonal reduction of real general matrix to upper Hessenberg form
		F08NFF	(SORGHR/DORGHR) Generate orthogonal transformation matrix from reduction to Hessenberg form determined by F08NEF
		F08NSF	(CGEHRD/ZGEHRD) Unitary reduction of complex general matrix to upper Hessenberg form
		F08NTF	(CUNGHR/ZUNGHR) Generate unitary transformation matrix from reduction to Hessenberg form determined by F08NSF
<b>D4c1b3</b>	Other	F08LEF	(SGBBRD/DGBBRD) Reduction of real rectangular band matrix to upper bidiagonal form
		F08LSF	(CGBBRD/ZGBBRD) Reduction of complex rectangular band matrix to upper bidiagonal form
<b>D4c1c</b>	Standardize problem	F01BVF	Reduction to standard form, generalized real symmetric-definite banded eigenproblem
		F08SEF	(SSYGST/DSYGST) Reduction to standard form of real symmetric-definite generalized eigenproblem $Ax = \lambda Bx$ , $ABx = \lambda x$ or $BAx = \lambda x$ , $B$ factorized by F07FDF
		F08SSF	(CHEGST/ZHEGST) Reduction to standard form of complex Hermitian-definite generalized eigenproblem $Ax = \lambda Bx$ , $ABx = \lambda x$ or $BAx = \lambda x$ , $B$ factorized by F07FRF
		F08TEF	(SSPGST/DSPGST) Reduction to standard form of real symmetric-definite generalized eigenproblem $Ax = \lambda Bx$ , $ABx = \lambda x$ or $BAx = \lambda x$ , packed storage, $B$ factorized by F07GDF
		F08TSF	(CHPGST/ZHPGST) Reduction to standard form of complex Hermitian-definite generalized eigenproblem $Ax = \lambda Bx$ , $ABx = \lambda x$ or $BAx = \lambda x$ , packed storage, $B$ factorized by F07GRF

	F08UEF	(SSBGST/DSBGST) Reduction of real symmetric-definite banded generalized eigenproblem $Ax = \lambda Bx$ to standard form $Cy = \lambda y$ , such that $C$ has the same bandwidth as $A$
	F08USF	(CHBGST/ZHBGST) Reduction of complex Hermitian-definite banded generalized eigenproblem $Ax = \lambda Bx$ to standard form $Cy = \lambda y$ , such that $C$ has the same bandwidth as $A$
<b>D4c2</b>	Compute eigenvalues of matrix in compact form	
<b>D4c2a</b>	Tridiagonal	
	F08FCF	(SSYEVD/DSYEVD) All eigenvalues and optionally all eigenvectors of real symmetric matrix, using divide and conquer
	F08FQF	(CHEEVD/ZHEEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian matrix, using divide and conquer
	F08GCF	(SSPEVD/DSPEVD) All eigenvalues and optionally all eigenvectors of real symmetric matrix, packed storage, using divide and conquer
	F08GQF	(CHPEVD/ZHPEVD) All eigenvalues and optionally all eigenvectors of complex Hermitian matrix, packed storage, using divide and conquer
	F08JCF	(SSTEVD/DSTEVD) All eigenvalues and optionally all eigenvectors of real symmetric tridiagonal matrix, using divide and conquer
	F08JEF	(SSTEQR/DSTEQR) All eigenvalues and eigenvectors of real symmetric tridiagonal matrix, reduced from real symmetric matrix using implicit $QL$ or $QR$
	F08JFF	(SSTERF/DSTERF) All eigenvalues of real symmetric tridiagonal matrix, root-free variant of $QL$ or $QR$
	F08JGF	(SPTEQR/DPTEQR) All eigenvalues and eigenvectors of real symmetric positive-definite tridiagonal matrix, reduced from real symmetric positive-definite matrix
	F08JJF	(SSTEBZ/DSTEBZ) Selected eigenvalues of real symmetric tridiagonal matrix by bisection
	F08JSF	(CSTEQR/ZSTEQR) All eigenvalues and eigenvectors of real symmetric tridiagonal matrix, reduced from complex Hermitian matrix, using implicit $QL$ or $QR$
	F08JUF	(CPTEQR/ZPTEQR) All eigenvalues and eigenvectors of real symmetric positive-definite tridiagonal matrix, reduced from complex Hermitian positive-definite matrix
<b>D4c2b</b>	Hessenberg	
	F08PEF	(SHSEQR/DHSEQR) Eigenvalues and Schur factorization of real upper Hessenberg matrix reduced from real general matrix
	F08PSF	(CHSEQR/ZHSEQR) Eigenvalues and Schur factorization of complex upper Hessenberg matrix reduced from complex general matrix
<b>D4c3</b>	Form eigenvectors from eigenvalues	
	F08JKF	(SSTEIN/DSTEIN) Selected eigenvectors of real symmetric tridiagonal matrix by inverse iteration, storing eigenvectors in real array
	F08JXF	(CSTEIN/ZSTEIN) Selected eigenvectors of real symmetric tridiagonal matrix by inverse iteration, storing eigenvectors in complex array
	F08PKF	(SHSEIN/DHSEIN) Selected right and/or left eigenvectors of real upper Hessenberg matrix by inverse iteration
	F08PXF	(CHSEIN/ZHSEIN) Selected right and/or left eigenvectors of complex upper Hessenberg matrix by inverse iteration
	F08QKF	(STREVC/DTREVC) Left and right eigenvectors of real upper quasi-triangular matrix
	F08QXF	(CTREVC/ZTREVC) Left and right eigenvectors of complex upper triangular matrix
<b>D4c4</b>	Back transform eigenvectors	
	F08FGF	(SORMTR/DORMTR) Apply orthogonal transformation determined by F08FEF
	F08FUF	(CUNMTR/ZUNMTR) Apply unitary transformation matrix determined by F08FSF
	F08GGF	(SOPMTR/DOPMTR) Apply orthogonal transformation determined by F08GEF
	F08GUF	(CUPMTR/ZUPMTR) Apply unitary transformation matrix determined by F08GSF
	F08NGF	(SORMHR/DORMHR) Apply orthogonal transformation matrix from reduction to Hessenberg form determined by F08NEF
	F08NJF	(SGEBAK/DGEBAK) Transform eigenvectors of real balanced matrix to those of original matrix supplied to F08NHF
	F08NUF	(CUNMHR/ZUNMHR) Apply unitary transformation matrix from reduction to Hessenberg form determined by F08NSF
	F08NWF	(CGEBAK/ZGEBAK) Transform eigenvectors of complex balanced matrix to those of original matrix supplied to F08NVF
<b>D5</b>	$QR$ decomposition, Gram–Schmidt orthogonalization	
	F01QGF	$RQ$ factorization of real $m$ by $n$ upper trapezoidal matrix ( $m \leq n$ )
	F01QJF	$RQ$ factorization of real $m$ by $n$ matrix ( $m \leq n$ )
	F01QKF	Operations with orthogonal matrices, form rows of $Q$ , after $RQ$ factorization by F01QJF
	F01RGF	$RQ$ factorization of complex $m$ by $n$ upper trapezoidal matrix ( $m \leq n$ )
	F01RJF	$RQ$ factorization of complex $m$ by $n$ matrix ( $m \leq n$ )
	F01RKF	Operations with unitary matrices, form rows of $Q$ , after $RQ$ factorization by F01RJF
	F05AAF	Gram–Schmidt orthogonalisation of $n$ vectors of order $m$

- F06QPF *QR* factorization by sequence of plane rotations, rank-1 update of real upper triangular matrix
- F06QQF *QR* factorization by sequence of plane rotations, real upper triangular matrix augmented by a full row
- F06QRF *QR* or *RQ* factorization by sequence of plane rotations, real upper Hessenberg matrix
- F06QSF *QR* or *RQ* factorization by sequence of plane rotations, real upper spiked matrix
- F06QTF *QR* factorization of *UZ* or *RQ* factorization of *ZU*, *U* real upper triangular, *Z* a sequence of plane rotations
- F06TPF *QR* factorization by sequence of plane rotations, rank-1 update of complex upper triangular matrix
- F06TQF *QRxk* factorization by sequence of plane rotations, complex upper triangular matrix augmented by a full row
- F06TRF *QR* or *RQ* factorization by sequence of plane rotations, complex upper Hessenberg matrix
- F06TSF *QR* or *RQ* factorization by sequence of plane rotations, complex upper spiked matrix
- F06TTF *QR* factorization of *UZ* or *RQ* factorization of *ZU*, *U* complex upper triangular, *Z* a sequence of plane rotations
- F08AEF (SGEQRF/DGEQRF) *QR* factorization of real general rectangular matrix
- F08AFF (SORGQR/DORGQR) Form all or part of orthogonal *Q* from *QR* factorization determined by F08AEF or F08BEF
- F08AGF (SORMQR/DORMQR) Apply orthogonal transformation determined by F08AEF or F08BEF
- F08AHF (SGELQF/DGELQF) *LQ* factorization of real general rectangular matrix
- F08AJF (SORGLQ/DORGLQ) Form all or part of orthogonal *Q* from *LQ* factorization determined by F08AHF
- F08AKF (SORMLQ/DORMLQ) Apply orthogonal transformation determined by F08AHF
- F08ASF (CGEQRF/ZGEQRF) *QR* factorization of complex general rectangular matrix
- F08ATF (CUNGQR/ZUNGQR) Form all or part of unitary *Q* from *QR* factorization determined by F08ASF or F08BSF
- F08AUF (CUNMQR/ZUNMQR) Apply unitary transformation determined by F08ASF or F08BSF
- F08AVF (CGELQF/ZGELQF) *LQ* factorization of complex general rectangular matrix
- F08AWF (CUNGLQ/ZUNGLQ) Form all or part of unitary *Q* from *LQ* factorization determined by F08AVF
- F08AXF (CUNMLQ/ZUNMLQ) Apply unitary transformation determined by F08AVF
- F08BEF (SGEQPF/DGEQPF) *QR* factorization of real general rectangular matrix with column pivoting
- F08BSF (CGEQPF/ZGEQPF) *QR* factorization of complex general rectangular matrix with column pivoting
- D6** Singular value decomposition
- F02WDF *QR* factorization, possibly followed by SVD
- F02WEF SVD of real matrix (Black Box)
- F02WUF SVD of real upper triangular matrix (Black Box)
- F02XEF SVD of complex matrix (Black Box)
- F02XUF SVD of complex upper triangular matrix (Black Box)
- F08KEF (SGEBRD/DGEBRD) Orthogonal reduction of real general rectangular matrix to bidiagonal form
- F08KFF (SORGBR/DORGBR) Generate orthogonal transformation matrices from reduction to bidiagonal form determined by F08KEF
- F08KGF (SORMBR/DORMBR) Apply orthogonal transformations from reduction to bidiagonal form determined by F08KEF
- F08KSF (CGEBRD/ZGEBRD) Unitary reduction of complex general rectangular matrix to bidiagonal form
- F08KTF (CUNGBR/ZUNGBR) Generate unitary transformation matrices from reduction to bidiagonal form determined by F08KSF
- F08KUF (CUNMBR/ZUNMBR) Apply unitary transformations from reduction to bidiagonal form determined by F08KSF
- F08MEF (SBDSQR/DBDSQR) SVD of real bidiagonal matrix reduced from real general matrix
- F08MSF (CBDSQR/ZBDSQR) SVD of real bidiagonal matrix reduced from complex general matrix
- D8** Other matrix equations (e.g.,  $AX + XB = C$ )
- F08QHF (STRSYL/DTRSYL) Solve real Sylvester matrix equation  $AX + XB = C$ , *A* and *B* are upper quasi-triangular or transposes
- F08QVF (CTRSYL/ZTRSYL) Solve complex Sylvester matrix equation  $AX + XB = C$ , *A* and *B* are upper triangular or conjugate-transposes
- D9** Singular, overdetermined or underdetermined systems of linear equations, generalized inverses
- D9a** Unconstrained
- D9a1** Least squares ( $L_2$ ) solution
- F04AMF Least-squares solution of *m* real equations in *n* unknowns, rank = *n*,  $m \geq n$  using iterative refinement (Black Box)

	F04JAF	Minimal least-squares solution of $m$ real equations in $n$ unknowns, rank $\leq n$ , $m \geq n$
	F04JDF	Minimal least-squares solution of $m$ real equations in $n$ unknowns, rank $\leq n$ , $m \geq n$
	F04JGF	Least-squares (if rank = $n$ ) or minimal least-squares (if rank $< n$ ) solution of $m$ real equations in $n$ unknowns, rank $\leq n$ , $m \geq n$
	F04JLF	Real general Gauss–Markov linear model (including weighted least-squares)
	F04KLF	Complex general Gauss–Markov linear model (including weighted least-squares)
	F04QAF	Sparse linear least-squares problem, $m$ real equations in $n$ unknowns
	F04YAF	Covariance matrix for linear least-squares problems, $m$ real equations in $n$ unknowns
<b>D9a2</b>	Chebyshev ( $L_\infty$ ) solution	
	E02GCF	$L_\infty$ -approximation by general linear function
<b>D9a3</b>	Least absolute value ( $L_1$ ) solution	
	E02GAF	$L_1$ -approximation by general linear function
<b>D9b</b>	Constrained	
<b>D9b1</b>	Least squares ( $L_2$ ) solution	
	E04NCF	Convex QP problem or linearly-constrained linear least-squares problem (dense)
	F04JMF	Equality-constrained real linear least-squares problem
	F04KMF	Equality-constrained complex linear least-squares problem
<b>D9b3</b>	Least absolute value ( $L_1$ )	
	E02GBF	$L_1$ -approximation by general linear function subject to linear inequality constraints
<b>D9c</b>	Generalized inverses	
	F01BLF	Pseudo-inverse and rank of real $m$ by $n$ matrix ( $m \geq n$ )
<b>E</b>	Interpolation	
<b>E1</b>	Univariate data (curve fitting)	
<b>E1a</b>	Polynomial splines (piecewise polynomials)	
	E01BAF	Interpolating functions, cubic spline interpolant, one variable
	E01BEF	Interpolating functions, monotonicity-preserving, piecewise cubic Hermite, one variable
	E02BAF	Least-squares curve cubic spline fit (including interpolation)
<b>E1b</b>	Polynomials	
	E01AAF	Interpolated values, Aitken’s technique, unequally spaced data, one variable
	E01ABF	Interpolated values, Everett’s formula, equally spaced data, one variable
	E01AEF	Interpolating functions, polynomial interpolant, data may include derivative values, one variable
	E02AFF	Least-squares polynomial fit, special data points (including interpolation)
<b>E1c</b>	Other functions (e.g., rational, trigonometric)	
	E01RAF	Interpolating functions, rational interpolant, one variable
<b>E2</b>	Multivariate data (surface fitting)	
<b>E2a</b>	Gridded	
	E01DAF	Interpolating functions, fitting bicubic spline, data on rectangular grid
<b>E2b</b>	Scattered	
	E01SAF	Interpolating functions, method of Renka and Cline, two variables
	E01SEF	Interpolating functions, modified Shepard’s method, two variables
	E01SGF	Interpolating functions, modified Shepard’s method, two variables
	E01SHF	Interpolated values, evaluate interpolant computed by E01SGF, function and first derivatives, two variables
	E01TGF	Interpolating functions, modified Shepard’s method, three variables
	E01THF	Interpolated values, evaluate interpolant computed by E01TGF, function and first derivatives, three variables
<b>E3</b>	Service routines for interpolation	
<b>E3a</b>	Evaluation of fitted functions, including quadrature	
<b>E3a1</b>	Function evaluation	
	E01BFF	Interpolated values, interpolant computed by E01BEF, function only, one variable
	E01RBF	Interpolated values, evaluate rational interpolant computed by E01RAF, one variable
	E01SBF	Interpolated values, evaluate interpolant computed by E01SAF, two variables
	E01SFF	Interpolated values, evaluate interpolant computed by E01SEF, two variables
	E02AEF	Evaluation of fitted polynomial in one variable from Chebyshev series form (simplified parameter list)
	E02AKF	Evaluation of fitted polynomial in one variable from Chebyshev series form
	E02BBF	Evaluation of fitted cubic spline, function only
	E02BCF	Evaluation of fitted cubic spline, function and derivatives
	E02CBF	Evaluation of fitted polynomial in two variables
	E02DEF	Evaluation of fitted bicubic spline at a vector of points
	E02DFE	Evaluation of fitted bicubic spline at a mesh of points
<b>E3a2</b>	Derivative evaluation	
	E01BGF	Interpolated values, interpolant computed by E01BEF, function and first derivative, one variable
	E02AHF	Derivative of fitted polynomial in Chebyshev series form
	E02BCF	Evaluation of fitted cubic spline, function and derivatives
<b>E3a3</b>	Quadrature	
	E01BHF	Interpolated values, interpolant computed by E01BEF, definite integral, one variable

		E02AJF	Integral of fitted polynomial in Chebyshev series form
		E02BDF	Evaluation of fitted cubic spline, definite integral
<b>E3d</b>	Other		
		E02ZAF	Sort two-dimensional data into panels for fitting bicubic splines
<b>F</b>	Solution of nonlinear equations		
<b>F1</b>	Single equation		
<b>F1a</b>	Polynomial		
<b>F1a1</b>	Real coefficients		
		C02AGF	All zeros of real polynomial, modified Laguerre method
		C02AJF	All zeros of real quadratic
<b>F1a2</b>	Complex coefficients		
		C02AFF	All zeros of complex polynomial, modified Laguerre method
		C02AHF	All zeros of complex quadratic
<b>F1b</b>	Nonpolynomial		
		C05ADF	Zero of continuous function in given interval, Bus and Dekker algorithm
		C05AGF	Zero of continuous function, Bus and Dekker algorithm, from given starting value, binary search for interval
		C05AJF	Zero of continuous function, continuation method, from a given starting value
		C05AVF	Binary search for interval containing zero of continuous function (reverse communication)
		C05AXF	Zero of continuous function by continuation method, from given starting value (reverse communication)
		C05AZF	Zero in given interval of continuous function by Bus and Dekker algorithm (reverse communication)
<b>F2</b>	System of equations		
		C05NBF	Solution of system of nonlinear equations using function values only (easy-to-use)
		C05NCF	Solution of system of nonlinear equations using function values only (comprehensive)
		C05NDF	Solution of system of nonlinear equations using function values only (reverse communication)
		C05PBF	Solution of system of nonlinear equations using first derivatives (easy-to-use)
		C05PCF	Solution of system of nonlinear equations using first derivatives (comprehensive)
		C05PDF	Solution of system of nonlinear equations using first derivatives (reverse communication)
<b>F3</b>	Service routines (e.g., check user-supplied derivatives)		
		C05ZAF	Check user's routine for calculating first derivatives
		E04HCF	Check user's routine for calculating first derivatives of function
		E04HDF	Check user's routine for calculating second derivatives of function
<b>G</b>	Optimization ( <i>search also classes K, L8</i> )		
<b>G1</b>	Unconstrained		
<b>G1a</b>	Univariate		
<b>G1a1</b>	Smooth function		
<b>G1a1a</b>	User provides no derivatives		
		E04ABF	Minimum, function of one variable using function values only
<b>G1a1b</b>	User provides first derivatives		
		E04BBF	Minimum, function of one variable, using first derivative
<b>G1b</b>	Multivariate		
<b>G1b1</b>	Smooth function		
<b>G1b1b</b>	User provides first derivatives		
		E04DGF	Unconstrained minimum, preconditioned conjugate gradient algorithm, function of several variables using first derivatives (comprehensive)
<b>G1b2</b>	General function (no smoothness assumed)		
		E04CCF	Unconstrained minimum, simplex algorithm, function of several variables using function values only (comprehensive)
<b>G2</b>	Constrained		
<b>G2a</b>	Linear programming		
<b>G2a1</b>	Dense matrix of constraints		
		E04MFF	LP problem (dense)
		E04NCF	Convex QP problem or linearly-constrained linear least-squares problem (dense)
		E04NFF	QP problem (dense)
		H02BFF	Interpret MPSX data file defining IP or LP problem, optimize and print solution
		H02CBF	Integer QP problem (dense)
<b>G2a2</b>	Sparse matrix of constraints		
		E04NKF	LP or QP problem (sparse)
		E04UGF	NLP problem (sparse)
		H02CEF	Integer LP or QP problem (sparse)
<b>G2b</b>	Transportation and assignments problem		
		H03ABF	Transportation problem, modified 'stepping stone' method
<b>G2c</b>	Integer programming		
<b>G2c1</b>	Zero/one		
		H02BBF	Integer LP problem (dense)
<b>G2c6</b>	Pure integer programming		
		H02BBF	Integer LP problem (dense)

<b>G2c7</b>	Mixed integer programming
	H02BBF Integer LP problem (dense)
	H02BFF Interpret MPSX data file defining IP or LP problem, optimize and print solution
<b>G2d</b>	Network (for network reliability search class M)
<b>G2d1</b>	Shortest path
	H03ADF Shortest path problem, Dijkstra's algorithm
<b>G2e</b>	Quadratic programming
<b>G2e1</b>	Positive-definite Hessian (i.e., convex problem)
	E04NCF Convex QP problem or linearly-constrained linear least-squares problem (dense)
	E04NFF QP problem (dense)
	E04NKF LP or QP problem (sparse)
	E04UGF NLP problem (sparse)
	H02CBF Integer QP problem (dense)
	H02CEF Integer LP or QP problem (sparse)
<b>G2e2</b>	Indefinite Hessian
	E04NFF QP problem (dense)
	E04NKF LP or QP problem (sparse)
	E04UGF NLP problem (sparse)
	H02CBF Integer QP problem (dense)
	H02CEF Integer LP or QP problem (sparse)
<b>G2h</b>	General nonlinear programming
<b>G2h1</b>	Simple bounds
<b>G2h1a</b>	Smooth function
<b>G2h1a1</b>	User provides no derivatives
	E04JYF Minimum, function of several variables, quasi-Newton algorithm, simple bounds, using function values only (easy-to-use)
	E04UCF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h1a2</b>	User provides first derivatives
	E04KDF Minimum, function of several variables, modified Newton algorithm, simple bounds, using first derivatives (comprehensive)
	E04KYF Minimum, function of several variables, quasi-Newton algorithm, simple bounds, using first derivatives (easy-to-use)
	E04KZF Minimum, function of several variables, modified Newton algorithm, simple bounds, using first derivatives (easy-to-use)
	E04UCF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h1a3</b>	User provides first and second derivatives
	E04LBF Minimum, function of several variables, modified Newton algorithm, simple bounds, using first and second derivatives (comprehensive)
	E04LYF Minimum, function of several variables, modified Newton algorithm, simple bounds, using first and second derivatives (easy-to-use)
<b>G2h2</b>	Linear equality or inequality constraints
<b>G2h2a</b>	Smooth function
<b>G2h2a1</b>	User provides no derivatives
	E04UCF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h2a2</b>	User provides first derivatives
	E04UCF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)

	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h3</b>	Nonlinear constraints	
<b>G2h3a</b>	Equality constraints only	
<b>G2h3a1</b>	Smooth function and constraints	
	E04UCF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h3b</b>	Equality and inequality constraints	
<b>G2h3b1</b>	Smooth function and constraints	
<b>G2h3b1a</b>	User provides no derivatives	
	E04UCF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G2h3b1b</b>	User provides first derivatives of function and constraints	
	E04UCF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>G4</b>	Service routines	
<b>G4a</b>	Problem input (e.g., matrix generation)	
	E04MZF	Converts MPSX data file defining LP or QP problem to format required by E04NKF
	E04UQF	Read optional parameter values for E04UNF from external file
	H02BUF	Convert MPSX data file defining IP or LP problem to format required by H02BBF or E04MFF
<b>G4c</b>	Check user-supplied derivatives	
	E04HCF	Check user's routine for calculating first derivatives of function
	E04HDF	Check user's routine for calculating second derivatives of function
	E04YAF	Check user's routine for calculating Jacobian of first derivatives
	E04YBF	Check user's routine for calculating Hessian of a sum of squares
	E04ZCF	Check user's routines for calculating first derivatives of function and constraints
<b>G4d</b>	Find feasible point	
	E04MFF	LP problem (dense)
	E04NCF	Convex QP problem or linearly-constrained linear least-squares problem (dense)
	E04NFF	QP problem (dense)
	E04NKF	LP or QP problem (sparse)
	E04UCF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (forward communication, comprehensive)
	E04UFF	Minimum, function of several variables, sequential QP method, nonlinear constraints, using function values and optionally first derivatives (reverse communication, comprehensive)
	E04UGF	NLP problem (sparse)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
	H02CBF	Integer QP problem (dense)
	H02CEF	Integer LP or QP problem (sparse)
<b>G4f</b>	Other	
	E04DJF	Read optional parameter values for E04DGF from external file
	E04DKF	Supply optional parameter values to E04DGF
	E04MGF	Read optional parameter values for E04MFF from external file
	E04MHF	Supply optional parameter values to E04MFF
	E04NDF	Read optional parameter values for E04NCF from external file
	E04NEF	Supply optional parameter values to E04NCF
	E04NGF	Read optional parameter values for E04NFF from external file
	E04NHF	Supply optional parameter values to E04NFF
	E04NLF	Read optional parameter values for E04NKF from external file
	E04NMF	Supply optional parameter values to E04NKF
	E04UDF	Read optional parameter values for E04UCF or E04UFF from external file

	E04UEF	Supply optional parameter values to E04UCF or E04UFF
	E04UHF	Read optional parameter values for E04UGF from external file
	E04UJF	Supply optional parameter values to E04UGF
	E04UQF	Read optional parameter values for E04UNF from external file
	E04URF	Supply optional parameter values to E04UNF
	E04XAF	Estimate (using numerical differentiation) gradient and/or Hessian of a function
	H02BVF	Print IP or LP solutions with user specified names for rows and columns
	H02BZF	Integer programming solution, supplies further information on solution obtained by H02BBF
	H02CCF	Read optional parameter values for H02CBF from external file
	H02CDF	Supply optional parameter values to H02CBF
	H02CFE	Read optional parameter values for H02CEF from external file
	H02CGF	Supply optional parameter values to H02CEF
<b>H</b>	Differentiation, integration	
<b>H1</b>	Numerical differentiation	
	D04AAF	Numerical differentiation, derivatives up to order 14, function of one real variable
	E04XAF	Estimate (using numerical differentiation) gradient and/or Hessian of a function
<b>H2</b>	Quadrature (numerical evaluation of definite integrals)	
<b>H2a</b>	One-dimensional integrals	
<b>H2a1</b>	Finite interval (general integrand)	
<b>H2a1a</b>	Integrand available via user-defined procedure	
<b>H2a1a1</b>	Automatic (user need only specify required accuracy)	
	D01AHF	One-dimensional quadrature, adaptive, finite interval, strategy due to Patterson, suitable for well-behaved integrands
	D01AJF	One-dimensional quadrature, adaptive, finite interval, strategy due to Piessens and de Doncker, allowing for badly-behaved integrands
	D01ARF	One-dimensional quadrature, non-adaptive, finite interval with provision for indefinite integrals
	D01ATF	One-dimensional quadrature, adaptive, finite interval, variant of D01AJF efficient on vector machines
	D01BDF	One-dimensional quadrature, non-adaptive, finite interval
<b>H2a1a2</b>	Nonautomatic	
	D01BAF	One-dimensional Gaussian quadrature
<b>H2a1b</b>	Integrand available only on grid	
<b>H2a1b2</b>	Nonautomatic	
	D01GAF	One-dimensional quadrature, integration of function defined by data values, Gill-Miller method
<b>H2a2</b>	Finite interval (specific or special type integrand including weight functions, oscillating and singular integrands, principal value integrals, splines, etc.)	
<b>H2a2a</b>	Integrand available via user-defined procedure	
<b>H2a2a1</b>	Automatic (user need only specify required accuracy)	
	D01AKF	One-dimensional quadrature, adaptive, finite interval, method suitable for oscillating functions
	D01ALF	One-dimensional quadrature, adaptive, finite interval, allowing for singularities at user-specified break-points
	D01ANF	One-dimensional quadrature, adaptive, finite interval, weight function $\cos(\omega x)$ or $\sin(\omega x)$
	D01APF	One-dimensional quadrature, adaptive, finite interval, weight function with end-point singularities of algebraico-logarithmic type
	D01AQF	One-dimensional quadrature, adaptive, finite interval, weight function $1/(x - c)$ , Cauchy principal value (Hilbert transform)
	D01AUF	One-dimensional quadrature, adaptive, finite interval, variant of D01AKF efficient on vector machines
<b>H2a2b</b>	Integrand available only on grid	
<b>H2a2b1</b>	Automatic (user need only specify required accuracy)	
	E02AJF	Integral of fitted polynomial in Chebyshev series form
	E02BDF	Evaluation of fitted cubic spline, definite integral
<b>H2a3</b>	Semi-infinite interval (including $e^{-x}$ weight function)	
<b>H2a3a</b>	Integrand available via user-defined procedure	
<b>H2a3a1</b>	Automatic (user need only specify required accuracy)	
	D01AMF	One-dimensional quadrature, adaptive, infinite or semi-infinite interval
	D01ASF	One-dimensional quadrature, adaptive, semi-infinite interval, weight function $\cos(\omega x)$ or $\sin(\omega x)$
<b>H2a3a2</b>	Nonautomatic	
	D01BAF	One-dimensional Gaussian quadrature
<b>H2a4</b>	Infinite interval (including $e^{-x^2}$ weight function)	
<b>H2a4a</b>	Integrand available via user-defined procedure	
<b>H2a4a1</b>	Automatic (user need only specify required accuracy)	
	D01AMF	One-dimensional quadrature, adaptive, infinite or semi-infinite interval
<b>H2a4a2</b>	Nonautomatic	
	D01BAF	One-dimensional Gaussian quadrature

- H2b** Multidimensional integrals
- H2b1** One or more hyper-rectangular regions (includes iterated integrals)
- H2b1a** Integrand available via user-defined procedure
- H2b1a1** Automatic (user need only specify required accuracy)
- D01DAF Two-dimensional quadrature, finite region
  - D01EAF Multi-dimensional adaptive quadrature over hyper-rectangle, multiple integrands
  - D01FCF Multi-dimensional adaptive quadrature over hyper-rectangle
  - D01GBF Multi-dimensional quadrature over hyper-rectangle, Monte Carlo method
- H2b1a2** Nonautomatic
- D01FBF Multi-dimensional Gaussian quadrature over hyper-rectangle
  - D01FDF Multi-dimensional quadrature, Sag-Szekeres method, general product region or  $n$ -sphere
  - D01GCF Multi-dimensional quadrature, general product region, number-theoretic method
  - D01GDF Multi-dimensional quadrature, general product region, number-theoretic method, variant of D01GCF efficient on vector machines
- H2b2**  $n$ -dimensional quadrature on a nonrectangular region
- H2b2a** Integrand available via user-defined procedure
- H2b2a1** Automatic (user need only specify required accuracy)
- D01JAF Multi-dimensional quadrature over an  $n$ -sphere, allowing for badly-behaved integrands
- H2b2a2** Nonautomatic
- D01PAF Multi-dimensional quadrature over an  $n$ -simplex
- H2c** Service routines (e.g., compute weights and nodes for quadrature formulas)
- D01BBF Pre-computed weights and abscissae for Gaussian quadrature rules, restricted choice of rule
  - D01BCF Calculation of weights and abscissae for Gaussian quadrature rules, general choice of rule
  - D01GYF Korobov optimal coefficients for use in D01GCF or D01GDF, when number of points is prime
  - D01GZF Korobov optimal coefficients for use in D01GCF or D01GDF, when number of points is product of two primes
- I** Differential and integral equations
- I1** Ordinary differential equations (ODE's)
- I1a** Initial value problems
- I1a1** General, nonstiff or mildly stiff
- I1a1a** One-step methods (e.g., Runge-Kutta)
- D02BGF ODEs, IVP, Runge-Kutta-Merson method, until a component attains given value (simple driver)
  - D02BHF ODEs, IVP, Runge-Kutta-Merson method, until function of solution is zero (simple driver)
  - D02BJF ODEs, IVP, Runge-Kutta method, until function of solution is zero, integration over range with intermediate output (simple driver)
  - D02LAF Second-order ODEs, IVP, Runge-Kutta-Nystrom method
  - D02PCF ODEs, IVP, Runge-Kutta method, integration over range with output
  - D02PDF ODEs, IVP, Runge-Kutta method, integration over one step
- I1a1b** Multistep methods (e.g., Adams predictor-corrector)
- D02CJF ODEs, IVP, Adams method, until function of solution is zero, intermediate output (simple driver)
  - D02QFF ODEs, IVP, Adams method with root-finding (forward communication, comprehensive)
  - D02QGF ODEs, IVP, Adams method with root-finding (reverse communication, comprehensive)
- I1a2** Stiff and mixed algebraic-differential equations
- D02EJF ODEs, stiff IVP, BDF method, until function of solution is zero, intermediate output (simple driver)
  - D02NBF Explicit ODEs, stiff IVP, full Jacobian (comprehensive)
  - D02NCF Explicit ODEs, stiff IVP, banded Jacobian (comprehensive)
  - D02NDF Explicit ODEs, stiff IVP, sparse Jacobian (comprehensive)
  - D02NGF Implicit/algebraic ODEs, stiff IVP, full Jacobian (comprehensive)
  - D02NHF Implicit/algebraic ODEs, stiff IVP, banded Jacobian (comprehensive)
  - D02NJF Implicit/algebraic ODEs, stiff IVP, sparse Jacobian (comprehensive)
  - D02NMF Explicit ODEs, stiff IVP (reverse communication, comprehensive)
  - D02NNF Implicit/algebraic ODEs, stiff IVP (reverse communication, comprehensive)
  - D03PKF General system of first-order PDEs, coupled DAEs, method of lines, Keller box discretisation, one space variable
  - D03PPF General system of parabolic PDEs, coupled DAEs, method of lines, finite differences, remeshing, one space variable
  - D03PRF General system of first-order PDEs, coupled DAEs, method of lines, Keller box discretisation, remeshing, one space variable
- I1b** Multipoint boundary value problems
- I1b1** Linear
- D02GBF ODEs, boundary value problem, finite difference technique with deferred correction, general linear problem

	D02JAF	ODEs, boundary value problem, collocation and least-squares, single $n$ th-order linear equation
	D02JBF	ODEs, boundary value problem, collocation and least-squares, system of first-order linear equations
	D02TGF	$n$ th-order linear ODEs, boundary value problem, collocation and least-squares
<b>I1b2</b>	Nonlinear	
	D02AGF	ODEs, boundary value problem, shooting and matching technique, allowing interior matching point, general parameters to be determined
	D02GAF	ODEs, boundary value problem, finite difference technique with deferred correction, simple nonlinear problem
	D02HAF	ODEs, boundary value problem, shooting and matching, boundary values to be determined
	D02HBF	ODEs, boundary value problem, shooting and matching, general parameters to be determined
	D02RAF	ODEs, general nonlinear boundary value problem, finite difference technique with deferred correction, continuation facility
	D02SAF	ODEs, boundary value problem, shooting and matching technique, subject to extra algebraic equations, general parameters to be determined
	D02TKF	ODEs, general nonlinear boundary value problem, collocation technique
<b>I1b3</b>	Eigenvalue (e.g., Sturm-Liouville)	
	D02AGF	ODEs, boundary value problem, shooting and matching technique, allowing interior matching point, general parameters to be determined
	D02HBF	ODEs, boundary value problem, shooting and matching, general parameters to be determined
	D02KAF	Second-order Sturm–Liouville problem, regular system, finite range, eigenvalue only
	D02KDF	Second-order Sturm–Liouville problem, regular/singular system, finite/infinite range, eigenvalue only, user-specified break-points
	D02KEF	Second-order Sturm–Liouville problem, regular/singular system, finite/infinite range, eigenvalue and eigenfunction, user-specified break-points
<b>I1c</b>	Service routines (e.g., interpolation of solutions, error handling, test programs)	
	D02LXF	Second-order ODEs, IVP, set-up for D02LAF
	D02LYF	Second-order ODEs, IVP, diagnostics for D02LAF
	D02LZF	Second-order ODEs, IVP, interpolation for D02LAF
	D02MVF	ODEs, IVP, DASSL method, set-up for D02M–N routines
	D02MZF	ODEs, IVP, interpolation for D02M–N routines, natural interpolant
	D02NRF	ODEs, IVP, for use with D02M–N routines, sparse Jacobian, enquiry routine
	D02NSF	ODEs, IVP, for use with D02M–N routines, full Jacobian, linear algebra set-up
	D02NTF	ODEs, IVP, for use with D02M–N routines, banded Jacobian, linear algebra set-up
	D02NUF	ODEs, IVP, for use with D02M–N routines, sparse Jacobian, linear algebra set-up
	D02NVF	ODEs, IVP, BDF method, set-up for D02M–N routines
	D02NWF	ODEs, IVP, Blend method, set-up for D02M–N routines
	D02NXF	ODEs, IVP, sparse Jacobian, linear algebra diagnostics, for use with D02M–N routines
	D02NYF	ODEs, IVP, integrator diagnostics, for use with D02M–N routines
	D02NZF	ODEs, IVP, set-up for continuation calls to integrator, for use with D02M–N routines
	D02PVF	ODEs, IVP, set-up for D02PCF and D02PDF
	D02PWF	ODEs, IVP, resets end of range for D02PDF
	D02PXF	ODEs, IVP, interpolation for D02PDF
	D02PYF	ODEs, IVP, integration diagnostics for D02PCF and D02PDF
	D02PZF	ODEs, IVP, error assessment diagnostics for D02PCF and D02PDF
	D02QWF	ODEs, IVP, set-up for D02QFF and D02QGF
	D02QXF	ODEs, IVP, diagnostics for D02QFF and D02QGF
	D02QYF	ODEs, IVP, root-finding diagnostics for D02QFF and D02QGF
	D02QZF	ODEs, IVP, interpolation for D02QFF or D02QGF
	D02TVF	ODEs, general nonlinear boundary value problem, set-up for D02TKF
	D02TXF	ODEs, general nonlinear boundary value problem, continuation facility for D02TKF
	D02TYF	ODEs, general nonlinear boundary value problem, interpolation for D02TKF
	D02TZF	ODEs, general nonlinear boundary value problem, diagnostics for D02TKF
	D02XJF	ODEs, IVP, interpolation for D02M–N routines, natural interpolant
	D02XKF	ODEs, IVP, interpolation for D02M–N routines, $C_1$ interpolant
	D02ZAF	ODEs, IVP, weighted norm of local error estimate for D02M–N routines
<b>I2</b>	Partial differential equations	
<b>I2a</b>	Initial boundary value problems	
<b>I2a1</b>	Parabolic	
<b>I2a1a</b>	One spatial dimension	
	D03PCF	General system of parabolic PDEs, method of lines, finite differences, one space variable
	D03PDF	General system of parabolic PDEs, method of lines, Chebyshev $C^0$ collocation, one space variable
	D03PEF	General system of first-order PDEs, method of lines, Keller box discretisation, one space variable

	D03PHF	General system of parabolic PDEs, coupled DAEs, method of lines, finite differences, one space variable
	D03PJF	General system of parabolic PDEs, coupled DAEs, method of lines, Chebyshev $C^0$ collocation, one space variable
	D03PKF	General system of first-order PDEs, coupled DAEs, method of lines, Keller box discretisation, one space variable
	D03PPF	General system of parabolic PDEs, coupled DAEs, method of lines, finite differences, remeshing, one space variable
	D03PRF	General system of first-order PDEs, coupled DAEs, method of lines, Keller box discretisation, remeshing, one space variable
	D03PYF	PDEs, spatial interpolation with D03PDF or D03PJF
	D03PZF	PDEs, spatial interpolation with D03PCF, D03PEF, D03PFF, D03PHF, D03PKF, D03PLF, D03PPF, D03PRF or D03PSF
<b>I2a1b</b>	Two or more spatial dimensions	
	D03RAF	General system of second-order PDEs, method of lines, finite differences, remeshing, two space variables, rectangular region
	D03RBF	General system of second-order PDEs, method of lines, finite differences, remeshing, two space variables, rectilinear region
	D03RYF	Check initial grid data in D03RBF
	D03RZF	Extract grid data from D03RBF
<b>I2a2</b>	Hyperbolic	
	D03PFF	General system of convection-diffusion PDEs with source terms in conservative form, method of lines, upwind scheme using numerical flux function based on Riemann solver, one space variable
	D03PLF	General system of convection-diffusion PDEs with source terms in conservative form, coupled DAEs, method of lines, upwind scheme using numerical flux function based on Riemann solver, one space variable
	D03PSF	General system of convection-diffusion PDEs with source terms in conservative form, coupled DAEs, method of lines, upwind scheme using numerical flux function based on Riemann solver, remeshing, one space variable
	D03PUF	Roe's approximate Riemann solver for Euler equations in conservative form, for use with D03PFF, D03PLF and D03PSF
	D03PVF	Osher's approximate Riemann solver for Euler equations in conservative form, for use with D03PFF, D03PLF and D03PSF
	D03PWF	Modified HLL Riemann solver for Euler equations in conservative form, for use with D03PFF, D03PLF and D03PSF
	D03PXF	Exact Riemann Solver for Euler equations in conservative form, for use with D03PFF, D03PLF and D03PSF
<b>I2b</b>	Elliptic boundary value problems	
<b>I2b1</b>	Linear	
<b>I2b1a</b>	Second order	
<b>I2b1a1</b>	Poisson (Laplace) or Helmholtz equation	
<b>I2b1a1a</b>	Rectangular domain (or topologically rectangular in the coordinate system)	
	D03FAF	Elliptic PDE, Helmholtz equation, three-dimensional Cartesian co-ordinates
<b>I2b1a1b</b>	Nonrectangular domain	
	D03EAF	Elliptic PDE, Laplace's equation, two-dimensional arbitrary domain
<b>I2b1a3</b>	Nonseparable problems	
	D03EEF	Discretize a second-order elliptic PDE on a rectangle
<b>I2b4</b>	Service routines	
	D03EEF	Discretize a second-order elliptic PDE on a rectangle
	D03PYF	PDEs, spatial interpolation with D03PDF or D03PJF
	D03PZF	PDEs, spatial interpolation with D03PCF, D03PEF, D03PFF, D03PHF, D03PKF, D03PLF, D03PPF, D03PRF or D03PSF
<b>I2b4a</b>	Domain triangulation ( <i>search also class P</i> )	
	D03MAF	Triangulation of plane region
<b>I2b4b</b>	Solution of discretized elliptic equations	
	D03EBF	Elliptic PDE, solution of finite difference equations by SIP, five-point two-dimensional molecule, iterate to convergence
	D03ECF	Elliptic PDE, solution of finite difference equations by SIP for seven-point three-dimensional molecule, iterate to convergence
	D03EDF	Elliptic PDE, solution of finite difference equations by a multigrid technique
	D03UAF	Elliptic PDE, solution of finite difference equations by SIP, five-point two-dimensional molecule, one iteration
	D03UBF	Elliptic PDE, solution of finite difference equations by SIP, seven-point three-dimensional molecule, one iteration
<b>I3</b>	Integral equations	
	D05AAF	Linear non-singular Fredholm integral equation, second kind, split kernel
	D05ABF	Linear non-singular Fredholm integral equation, second kind, smooth kernel
	D05BAF	Nonlinear Volterra convolution equation, second kind
	D05BDF	Nonlinear convolution Volterra-Abel equation, second kind, weakly singular
	D05BEF	Nonlinear convolution Volterra-Abel equation, first kind, weakly singular
	D05BWF	Generate weights for use in solving Volterra equations

		D05BYF	Generate weights for use in solving weakly singular Abel-type equations
<b>J</b>	Integral transforms		
<b>J1</b>	Trigonometric transforms including fast Fourier transforms		
<b>J1a</b>	One-dimensional		
<b>J1a1</b>	Real		
		C06EAF	Single one-dimensional real discrete Fourier transform, no extra workspace
		C06FAF	Single one-dimensional real discrete Fourier transform, extra workspace for greater speed
		C06FPF	Multiple one-dimensional real discrete Fourier transforms
		C06PAF	Single 1D real and Hermitian complex discrete Fourier transform, using complex data format for Hermitian sequences
		C06PAF	Single one-dimensional real and Hermitian complex discrete Fourier transform, using complex data format for Hermitian sequences
		C06PPF	Multiple 1D real and Hermitian complex discrete Fourier transforms, using complex data format for Hermitian sequences
		C06PPF	Multiple one-dimensional real and Hermitian complex discrete Fourier transforms, using complex data format for Hermitian sequences
		C06PQF	Multiple one-dimensional real and Hermitian complex discrete Fourier transforms, using complex data format for Hermitian sequences and sequences stored as columns
<b>J1a2</b>	Complex		
		C06EBF	Single one-dimensional Hermitian discrete Fourier transform, no extra workspace
		C06ECF	Single one-dimensional complex discrete Fourier transform, no extra workspace
		C06FBF	Single one-dimensional Hermitian discrete Fourier transform, extra workspace for greater speed
		C06FCF	Single one-dimensional complex discrete Fourier transform, extra workspace for greater speed
		C06FFF	One-dimensional complex discrete Fourier transform of multi-dimensional data
		C06FQF	Multiple one-dimensional Hermitian discrete Fourier transforms
		C06FRF	Multiple one-dimensional complex discrete Fourier transforms
		C06GBF	Complex conjugate of Hermitian sequence
		C06GCF	Complex conjugate of complex sequence
		C06GQF	Complex conjugate of multiple Hermitian sequences
		C06GSF	Convert Hermitian sequences to general complex sequences
		C06PCF	Single 1D complex discrete Fourier transform, complex data format
		C06PCF	Single one-dimensional complex discrete Fourier transform, complex data format
		C06PFF	1D complex discrete Fourier transform of multi-dimensional data (using the complex data type)
		C06PFF	One-dimensional complex discrete Fourier transform of multi-dimensional data (using complex data type)
		C06PRF	Multiple 1D complex discrete Fourier transforms using complex data format
		C06PRF	Multiple one-dimensional complex discrete Fourier transforms using complex data format
		C06PSF	Multiple one-dimensional complex discrete Fourier transforms using complex data format and sequences stored as columns
<b>J1a3</b>	Sine and cosine transforms		
		C06HAF	Discrete sine transform
		C06HBF	Discrete cosine transform
		C06HCF	Discrete quarter-wave sine transform
		C06HDF	Discrete quarter-wave cosine transform
		C06RAF	Discrete sine transform (easy-to-use)
		C06RAF	Discrete sine transform (easy-to-use)
		C06RBF	Discrete cosine transform (easy-to-use)
		C06RBF	Discrete cosine transform (easy-to-use)
		C06RCF	Discrete quarter-wave sine transform (easy-to-use)
		C06RCF	Discrete quarter-wave sine transform (easy-to-use)
		C06RDF	Discrete quarter-wave cosine transform (easy-to-use)
		C06RDF	Discrete quarter-wave cosine transform (easy-to-use)
<b>J1b</b>	Multidimensional		
		C06FJF	Multi-dimensional complex discrete Fourier transform of multi-dimensional data
		C06FUF	Two-dimensional complex discrete Fourier transform
		C06FXF	Three-dimensional complex discrete Fourier transform
		C06PJF	Multi-dimensional complex discrete Fourier transform of multi-dimensional data (using complex data type)
		C06PJF	Multi-dimensional complex discrete Fourier transform of multi-dimensional data (using complex data type)
		C06PUF	2D complex discrete Fourier transform, complex data format
		C06PUF	Two-dimensional complex discrete Fourier transform, complex data format
		C06PXF	3D complex discrete Fourier transform, complex data format
		C06PXF	Three-dimensional complex discrete Fourier transform, complex data format
<b>J2</b>	Convolutions		
		C06EKF	Circular convolution or correlation of two real vectors, no extra workspace

		C06FKF	Circular convolution or correlation of two real vectors, extra workspace for greater speed
		C06PKF	Circular convolution or correlation of two complex vectors
		C06PKF	Circular convolution or correlation of two complex vectors
<b>J3</b>	Laplace transforms		
		C06LAF	Inverse Laplace transform, Crump's method
		C06LBF	Inverse Laplace transform, modified Weeks' method
		C06LCF	Evaluate inverse Laplace transform as computed by C06LBF
<b>J4</b>	Hilbert transforms		
		D01AQF	One-dimensional quadrature, adaptive, finite interval, weight function $1/(x - c)$ , Cauchy principal value (Hilbert transform)
<b>K</b>	Approximation ( <i>search also class L8</i> )		
<b>K1</b>	Least squares ( $L_2$ ) approximation		
<b>K1a</b>	Linear least squares ( <i>search also classes D5, D6, D9</i> )		
<b>K1a1</b>	Unconstrained		
<b>K1a1a</b>	Univariate data (curve fitting)		
<b>K1a1a1</b>	Polynomial splines (piecewise polynomials)		
		E02BAF	Least-squares curve cubic spline fit (including interpolation)
		E02BEF	Least-squares cubic spline curve fit, automatic knot placement
<b>K1a1a2</b>	Polynomials		
		E02ADF	Least-squares curve fit, by polynomials, arbitrary data points
		E02AFF	Least-squares polynomial fit, special data points (including interpolation)
<b>K1a1b</b>	Multivariate data (surface fitting)		
		E02CAF	Least-squares surface fit by polynomials, data on lines
		E02DAF	Least-squares surface fit, bicubic splines
		E02DCF	Least-squares surface fit by bicubic splines with automatic knot placement, data on rectangular grid
		E02DDF	Least-squares surface fit by bicubic splines with automatic knot placement, scattered data
<b>K1a2</b>	Constrained		
<b>K1a2a</b>	Linear constraints		
		E02AGF	Least-squares polynomial fit, values and derivatives may be constrained, arbitrary data points
<b>K1b</b>	Nonlinear least squares		
<b>K1b1</b>	Unconstrained		
<b>K1b1a</b>	Smooth functions		
<b>K1b1a1</b>	User provides no derivatives		
		E04FCF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using function values only (comprehensive)
		E04FYF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using function values only (easy-to-use)
<b>K1b1a2</b>	User provides first derivatives		
		E04GBF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and quasi-Newton algorithm using first derivatives (comprehensive)
		E04GDF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using first derivatives (comprehensive)
		E04GYF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and quasi-Newton algorithm, using first derivatives (easy-to-use)
		E04GZF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using first derivatives (easy-to-use)
<b>K1b1a3</b>	User provides first and second derivatives		
		E04HEF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm, using second derivatives (comprehensive)
		E04HYF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm, using second derivatives (easy-to-use)
<b>K1b2</b>	Constrained		
<b>K1b2b</b>	Nonlinear constraints		
		E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>K2</b>	Minimax ( $L_\infty$ ) approximation		
		E02ACF	Minimax curve fit by polynomials
<b>K4</b>	Other analytic approximations (e.g., Taylor polynomial, Padé)		
		E02RAF	Padé-approximants
<b>K6</b>	Service routines for approximation		
<b>K6a</b>	Evaluation of fitted functions, including quadrature		
<b>K6a1</b>	Function evaluation		
		E02AEF	Evaluation of fitted polynomial in one variable from Chebyshev series form (simplified parameter list)
		E02AKF	Evaluation of fitted polynomial in one variable from Chebyshev series form
		E02BBF	Evaluation of fitted cubic spline, function only
		E02BCF	Evaluation of fitted cubic spline, function and derivatives
		E02CBF	Evaluation of fitted polynomial in two variables

	E02RBF	Evaluation of fitted rational function as computed by E02RAF
<b>K6a2</b>	Derivative evaluation	
	E02AHF	Derivative of fitted polynomial in Chebyshev series form
	E02BCF	Evaluation of fitted cubic spline, function and derivatives
<b>K6a3</b>	Quadrature	
	E02AJF	Integral of fitted polynomial in Chebyshev series form
	E02BDF	Evaluation of fitted cubic spline, definite integral
<b>K6d</b>	Other	
	E02ZAF	Sort two-dimensional data into panels for fitting bicubic splines
<b>L</b>	Statistics, probability	
<b>L1</b>	Data summarization	
<b>L1a</b>	One-dimensional data	
<b>L1a1</b>	Raw data	
	G01AAF	Mean, variance, skewness, kurtosis, etc, one variable, from raw data
	G01ALF	Computes a five-point summary (median, hinges and extremes)
	G07DAF	Robust estimation, median, median absolute deviation, robust standard deviation
	G07DBF	Robust estimation, $M$ -estimates for location and scale parameters, standard weight functions
	G07DCF	Robust estimation, $M$ -estimates for location and scale parameters, user-defined weight functions
	G07DDF	Computes a trimmed and winsorized mean of a single sample with estimates of their variance
<b>L1a3</b>	Grouped data	
	G01ADF	Mean, variance, skewness, kurtosis, etc, one variable, from frequency table
<b>L1b</b>	Two dimensional data ( <i>search also class L1c</i> )	
	G01ABF	Mean, variance, skewness, kurtosis, etc, two variables, from raw data
<b>L1c</b>	Multi-dimensional data	
<b>L1c1</b>	Raw data	
	G02BDF	Correlation-like coefficients (about zero), all variables, no missing values
	G02BKF	Correlation-like coefficients (about zero), subset of variables, no missing values
	G11BAF	Computes multiway table from set of classification factors using selected statistic
	G11BBF	Computes multiway table from set of classification factors using given percentile/quantile
<b>L1c1b</b>	Covariance, correlation	
	G02BAF	Pearson product-moment correlation coefficients, all variables, no missing values
	G02BGF	Pearson product-moment correlation coefficients, subset of variables, no missing values
	G02BNF	Kendall/Spearman non-parametric rank correlation coefficients, no missing values, overwriting input data
	G02BQF	Kendall/Spearman non-parametric rank correlation coefficients, no missing values, preserving input data
	G02BTF	Update a weighted sum of squares matrix with a new observation
	G02BUF	Computes a weighted sum of squares matrix
	G02BWF	Computes a correlation matrix from a sum of squares matrix
	G02BXF	Computes (optionally weighted) correlation and covariance matrices
	G02BYF	Computes partial correlation/variance-covariance matrix from correlation/variance-covariance matrix computed by G02BXF
	G02HKF	Calculates a robust estimation of a correlation matrix, Huber's weight function
	G02HLF	Calculates a robust estimation of a correlation matrix, user-supplied weight function plus derivatives
	G02HMF	Calculates a robust estimation of a correlation matrix, user-supplied weight function
<b>L1c2</b>	Raw data containing missing values ( <i>search also class L1c1</i> )	
	G02BBF	Pearson product-moment correlation coefficients, all variables, casewise treatment of missing values
	G02BCF	Pearson product-moment correlation coefficients, all variables, pairwise treatment of missing values
	G02BEF	Correlation-like coefficients (about zero), all variables, casewise treatment of missing values
	G02BFF	Correlation-like coefficients (about zero), all variables, pairwise treatment of missing values
	G02BHF	Pearson product-moment correlation coefficients, subset of variables, casewise treatment of missing values
	G02BJF	Pearson product-moment correlation coefficients, subset of variables, pairwise treatment of missing values
	G02BLF	Correlation-like coefficients (about zero), subset of variables, casewise treatment of missing values
	G02BMF	Correlation-like coefficients (about zero), subset of variables, pairwise treatment of missing values
	G02BPF	Kendall/Spearman non-parametric rank correlation coefficients, casewise treatment of missing values, overwriting input data
	G02BRF	Kendall/Spearman non-parametric rank correlation coefficients, casewise treatment of missing values, preserving input data

		G02BSF	Kendall/Spearman non-parametric rank correlation coefficients, pairwise treatment of missing values
<b>L2</b>	Data manipulation		
<b>L2a</b>	Transform ( <i>search also classes L10a1, N6, and N8</i> )	G03ZAF	Produces standardized values ( <i>z</i> -scores) for a data matrix
<b>L2b</b>	Tally	G01AEF	Frequency table from raw data
		G11BAF	Computes multiway table from set of classification factors using selected statistic
		G11BBF	Computes multiway table from set of classification factors using given percentile/quantile
		G11BCF	Computes marginal tables for multiway table computed by G11BAF or G11BBF
		G11SBF	Frequency count for G11SAF
<b>L2c</b>	Subset	G02CEF	Service routines for multiple linear regression, select elements from vectors and matrices
<b>L3</b>	Elementary statistical graphics ( <i>search also class Q</i> )		
<b>L3a</b>	One-dimensional data		
<b>L3a1</b>	Histograms	G01AJF	Lineprinter histogram of one variable
<b>L3a3</b>	EDA (e.g., box-plots)	G01ARF	Constructs a stem and leaf plot
		G01ASF	Constructs a box and whisker plot
<b>L3b</b>	Two-dimensional data ( <i>search also class L3e</i> )		
<b>L3b3</b>	Scatter diagrams		
<b>L3b3a</b>	<i>Y</i> vs. <i>X</i>	G01AGF	Lineprinter scatterplot of two variables
<b>L4</b>	Elementary data analysis		
<b>L4a</b>	One-dimensional data		
<b>L4a1</b>	Raw data		
<b>L4a1a</b>	Parametric analysis		
<b>L4a1a2</b>	Probability plots		
<b>L4a1a2n</b>	Negative binomial, normal	G01AHF	Lineprinter scatterplot of one variable against Normal scores
		G01DCF	Normal scores, approximate variance-covariance matrix
		G01DHF	Ranks, Normal scores, approximate Normal scores or exponential (Savage) scores
<b>L4a1a4</b>	Parameter estimates and tests		
<b>L4a1a4b</b>	Binomial	G07AAF	Computes confidence interval for the parameter of a binomial distribution
<b>L4a1a4n</b>	Normal	G01DDF	Shapiro and Wilk's <i>W</i> test for Normality
		G07BBF	Computes maximum likelihood estimates for parameters of the Normal distribution from grouped and/or censored data
		G07CAF	Computes <i>t</i> -test statistic for a difference in means between two Normal populations, confidence interval
<b>L4a1a4p</b>	Poisson	G07ABF	Computes confidence interval for the parameter of a Poisson distribution
<b>L4a1a4w</b>	Weibull	G07BEF	Computes maximum likelihood estimates for parameters of the Weibull distribution
<b>L4a1b</b>	Nonparametric analysis		
<b>L4a1b1</b>	Estimates and tests regarding location (e.g., median), dispersion, and shape	G07EAF	Robust confidence intervals, one-sample
		G07EBF	Robust confidence intervals, two-sample
		G08AGF	Performs the Wilcoxon one-sample (matched pairs) signed rank test
		G08AHF	Performs the Mann–Whitney <i>U</i> test on two independent samples
		G08AJF	Computes the exact probabilities for the Mann–Whitney <i>U</i> statistic, no ties in pooled sample
		G08AKF	Computes the exact probabilities for the Mann–Whitney <i>U</i> statistic, ties in pooled sample
<b>L4a1b2</b>	Density function estimation	G10BAF	Kernel density estimate using Gaussian kernel
<b>L4a1c</b>	Goodness-of-fit tests	G08CBF	Performs the one-sample Kolmogorov–Smirnov test for standard distributions
		G08CCF	Performs the one-sample Kolmogorov–Smirnov test for a user-supplied distribution
		G08CDF	Performs the two-sample Kolmogorov–Smirnov test
		G08CGF	Performs the $\chi^2$ goodness of fit test, for standard continuous distributions
<b>L4a1d</b>	Analysis of a sequence of numbers ( <i>search also class L10a</i> )	G08EAF	Performs the runs up or runs down test for randomness
		G08EEF	Performs the pairs (serial) test for randomness
		G08ECF	Performs the triplets test for randomness
		G08EDF	Performs the gaps test for randomness

<b>L4a3</b>	Grouped and/or censored data	
	G07BBF	Computes maximum likelihood estimates for parameters of the Normal distribution from grouped and/or censored data
	G07BEF	Computes maximum likelihood estimates for parameters of the Weibull distribution
<b>L4a5</b>	Categorical data	
	G11AAF	$\chi^2$ statistics for two-way contingency table
<b>L4b</b>	Two dimensional data ( <i>search also class L4c</i> )	
<b>L4b1</b>	Pairwise independent data	
<b>L4b1b</b>	Nonparametric analysis (e.g., rank tests)	
	G08ACF	Median test on two samples of unequal size
	G08BAF	Mood's and David's tests on two samples of unequal size
<b>L4b3</b>	Pairwise dependent data	
	G08AAF	Sign test on two paired samples
<b>L4c</b>	Multi-dimensional data ( <i>search also classes L4b and L7a1</i> )	
<b>L4c1</b>	Independent data	
<b>L4c1b</b>	Nonparametric analysis	
	G08DAF	Kendall's coefficient of concordance
<b>L5</b>	Function evaluation ( <i>search also class C</i> )	
<b>L5a</b>	Univariate	
<b>L5a1</b>	Cumulative distribution functions, probability density functions	
	G01EMF	Computes probability for the Studentized range statistic
	G01EPF	Computes bounds for the significance of a Durbin-Watson statistic
	G01JDF	Computes lower tail probability for a linear combination of (central) $\chi^2$ variables
<b>L5a1b</b>	Beta, binomial	
	G01BJF	Binomial distribution function
	G01EEF	Computes upper and lower tail probabilities and probability density function for the beta distribution
	G01GEF	Computes probabilities for the non-central beta distribution
<b>L5a1c</b>	Cauchy, $\chi^2$	
	G01ECF	Computes probabilities for $\chi^2$ distribution
	G01GCF	Computes probabilities for the non-central $\chi^2$ distribution
	G01JCF	Computes probability for a positive linear combination of $\chi^2$ variables
<b>L5a1e</b>	Error function, exponential, extreme value	
	S15ADF	Complement of error function $\text{erfc}(x)$
	S15AEF	Error function $\text{erf}(x)$
<b>L5a1f</b>	$F$ distribution	
	G01EDF	Computes probabilities for $F$ -distribution
	G01GDF	Computes probabilities for the non-central $F$ -distribution
<b>L5a1g</b>	Gamma, general, geometric	
	G01EFF	Computes probabilities for the gamma distribution
<b>L5a1h</b>	Halfnormal, hypergeometric	
	G01BLF	Hypergeometric distribution function
<b>L5a1k</b>	Kendall $F$ statistic, Kolmogorov-Smirnov	
	G01EYF	Computes probabilities for the one-sample Kolmogorov-Smirnov distribution
	G01EZF	Computes probabilities for the two-sample Kolmogorov-Smirnov distribution
<b>L5a1n</b>	Negative binomial, normal	
	G01EAF	Computes probabilities for the standard Normal distribution
	G01MBF	Computes reciprocal of Mills' Ratio
	S15ABF	Cumulative normal distribution function $P(x)$
	S15ACF	Complement of cumulative normal distribution function $Q(x)$
<b>L5a1p</b>	Pareto, Poisson	
	G01BKF	Poisson distribution function
<b>L5a1t</b>	$t$ distribution	
	G01EBF	Computes probabilities for Student's $t$ -distribution
	G01GBF	Computes probabilities for the non-central Student's $t$ -distribution
<b>L5a1v</b>	Von Mises	
	G01ERF	Computes probability for von Mises distribution
<b>L5a2</b>	Inverse distribution functions, sparsity functions	
	G01FMF	Computes deviates for the Studentized range statistic
<b>L5a2b</b>	Beta, binomial	
	G01FEF	Computes deviates for the beta distribution
<b>L5a2c</b>	Cauchy, $\chi^2$	
	G01FCF	Computes deviates for the $\chi^2$ distribution
<b>L5a2f</b>	$F$ distribution	
	G01FDF	Computes deviates for the $F$ -distribution
<b>L5a2g</b>	Gamma, general, geometric	
	G01FFF	Computes deviates for the gamma distribution
<b>L5a2n</b>	Negative binomial, normal, normal order statistics	
	G01DAF	Normal scores, accurate values
	G01DBF	Normal scores, approximate values
	G01FAF	Computes deviates for the standard Normal distribution

<b>L5a2t</b>	<i>t</i> distribution	
	G01FBF	Computes deviates for Student's <i>t</i> -distribution
<b>L5b</b>	Multivariate	
	G01NAF	Cumulants and moments of quadratic forms in Normal variables
	G01NBF	Moments of ratios of quadratic forms in Normal variables, and related statistics
<b>L5b1</b>	Cumulative multivariate distribution functions, probability density functions	
<b>L5b1n</b>	Normal	
	G01HAF	Computes probability for the bivariate Normal distribution
	G01HBF	Computes probabilities for the multivariate Normal distribution
<b>L6</b>	Random number generation	
<b>L6a</b>	Univariate	
	G05EYF	Pseudo-random integer from reference vector
<b>L6a2</b>	Beta, binomial, Boolean	
	G05DZF	Pseudo-random logical (boolean) value
	G05EDF	Set up reference vector for generating pseudo-random integers, binomial distribution
	G05FEF	Generates a vector of pseudo-random numbers from a beta distribution
<b>L6a3</b>	Cauchy, $\chi^2$	
	G05DFF	Pseudo-random real numbers, Cauchy distribution
	G05DHF	Pseudo-random real numbers, $\chi^2$ distribution
<b>L6a5</b>	Exponential, extreme value	
	G05DBF	Pseudo-random real numbers, (negative) exponential distribution
	G05FBF	Generates a vector of random numbers from an (negative) exponential distribution
<b>L6a6</b>	<i>F</i> distribution	
	G05DKF	Pseudo-random real numbers, <i>F</i> -distribution
<b>L6a7</b>	Gamma, general (continuous, discrete), geometric	
	G05EXF	Set up reference vector from supplied cumulative distribution function or probability distribution function
	G05FFF	Generates a vector of pseudo-random numbers from a gamma distribution
<b>L6a8</b>	Halfnormal, hypergeometric	
	G05EFF	Set up reference vector for generating pseudo-random integers, hypergeometric distribution
<b>L6a12</b>	Lambda, logistic, lognormal	
	G05DCF	Pseudo-random real numbers, logistic distribution
	G05DEF	Pseudo-random real numbers, log-normal distribution
<b>L6a14</b>	Negative binomial, normal, normal order statistics	
	G05DDF	Pseudo-random real numbers, Normal distribution
	G05EEF	Set up reference vector for generating pseudo-random integers, negative binomial distribution
	G05FDF	Generates a vector of random numbers from a Normal distribution
<b>L6a16</b>	Pareto, Pascal, permutations, Poisson	
	G05DRF	Pseudo-random integer, Poisson distribution
	G05ECF	Set up reference vector for generating pseudo-random integers, Poisson distribution
	G05EHF	Pseudo-random permutation of an integer vector
<b>L6a19</b>	Samples, stable distribution	
	G05EJF	Pseudo-random sample from an integer vector
<b>L6a20</b>	<i>t</i> distribution, time series, triangular	
	G05DJF	Pseudo-random real numbers, Student's <i>t</i> -distribution
	G05EGF	Set up reference vector for univariate ARMA time series model
	G05EWF	Generate next term from reference vector for ARMA time series model
<b>L6a21</b>	Uniform (continuous, discrete), uniform order statistics	
	G05CAF	Pseudo-random real numbers, uniform distribution over (0,1)
	G05DAF	Pseudo-random real numbers, uniform distribution over ( <i>a</i> , <i>b</i> )
	G05DYF	Pseudo-random integer from uniform distribution
	G05EEF	Set up reference vector for generating pseudo-random integers, uniform distribution
	G05FAF	Generates a vector of random numbers from a uniform distribution
<b>L6a22</b>	Von Mises	
	G05FSF	Generates a vector of pseudo-random variates from von Mises distribution
<b>L6a23</b>	Weibull	
	G05DPF	Pseudo-random real numbers, Weibull distribution
<b>L6b</b>	Multivariate	
	G05HDF	Generates a realisation of a multivariate time series from a VARMA model
<b>L6b3</b>	Contingency table, correlation matrix	
	G05GBF	Computes random correlation matrix
<b>L6b14</b>	Normal	
	G05EAF	Set up reference vector for multivariate Normal distribution
	G05EZF	Pseudo-random multivariate Normal vector from reference vector
<b>L6b15</b>	Orthogonal matrix	
	G05GAF	Computes random orthogonal matrix
<b>L6c</b>	Service routines (e.g., seed)	
	G05CBF	Initialise random number generating routines to give repeatable sequence
	G05CCF	Initialise random number generating routines to give non-repeatable sequence

		G05CFF	Save state of random number generating routines
		G05CGF	Restore state of random number generating routines
<b>L7</b>	Analysis of variance (including analysis of covariance)		
<b>L7a</b>	One-way		
<b>L7a1</b>	Parametric		
		G04BBF	Analysis of variance, randomized block or completely randomized design, treatment means and standard errors
		G04DAF	Computes sum of squares for contrast between means
		G04DBF	Computes confidence intervals for differences between means computed by G04BBF or G04BCF
<b>L7a2</b>	Nonparametric		
		G08AFF	Kruskal–Wallis one-way analysis of variance on $k$ samples of unequal size
<b>L7b</b>	Two-way ( <i>search also class L7d</i> )		
		G04AGF	Two-way analysis of variance, hierarchical classification, subgroups of unequal size
		G04BBF	Analysis of variance, randomized block or completely randomized design, treatment means and standard errors
		G08AEF	Friedman two-way analysis of variance on $k$ matched samples
		G08ALF	Performs the Cochran $Q$ test on cross-classified binary data
<b>L7c</b>	Three-way (e.g., Latin squares) ( <i>search also class L7d</i> )		
		G04BCF	Analysis of variance, general row and column design, treatment means and standard errors
<b>L7d</b>	Multi-way		
<b>L7d1</b>	Balanced complete data (e.g., factorial designs)		
		G04CAF	Analysis of variance, complete factorial design, treatment means and standard errors
<b>L7d2</b>	Balanced incomplete data		
		F04JLF	Real general Gauss–Markov linear model (including weighted least-squares)
<b>L7f</b>	Generate experimental designs		
		G02DAF	Fits a general (multiple) linear regression model
		G02DNF	Computes estimable function of a general linear regression model and its standard error
<b>L7g</b>	Service routines		
		G04EAF	Computes orthogonal polynomials or dummy variables for factor/classification variable
<b>L8</b>	Regression ( <i>search also classes D5, D6, D9, G, K</i> )		
<b>L8a</b>	Simple linear (i.e., $y = b_0 + b_1x$ ) ( <i>search also class L8h</i> )		
<b>L8a1</b>	Ordinary least squares		
<b>L8a1a</b>	Parameter estimation		
<b>L8a1a1</b>	Unweighted data		
		G02CAF	Simple linear regression with constant term, no missing values
		G02CBF	Simple linear regression without constant term, no missing values
		G02CCF	Simple linear regression with constant term, missing values
		G02CDF	Simple linear regression without constant term, missing values
<b>L8a2</b>	$L_p$ for $p$ different from 2 (e.g., least absolute value, minimax)		
		E02GAF	$L_1$ -approximation by general linear function
		E02GCF	$L_\infty$ -approximation by general linear function
<b>L8b</b>	Polynomial (e.g., $y = b_0 + b_1x + b_2x^2$ ) ( <i>search also class L8c</i> )		
<b>L8b1</b>	Ordinary least squares		
<b>L8b1b</b>	Parameter estimation		
<b>L8b1b2</b>	Using orthogonal polynomials		
		E02ADF	Least-squares curve fit, by polynomials, arbitrary data points
<b>L8c</b>	Multiple linear (i.e., $y = b_0 + b_1x_1 + \dots + b_px_p$ )		
		F04JLF	Real general Gauss–Markov linear model (including weighted least-squares)
		F04JMF	Equality-constrained real linear least-squares problem
<b>L8c1</b>	Ordinary least squares		
<b>L8c1a</b>	Variable selection		
		G02ECF	Calculates $R^2$ and $C_P$ values from residual sums of squares
<b>L8c1a1</b>	Using raw data		
		G02DDF	Estimates of linear parameters and general linear regression model from updated model
		G02DEF	Add a new variable to a general linear regression model
		G02DFF	Delete a variable from a general linear regression model
		G02EAF	Computes residual sums of squares for all possible linear regressions for a set of independent variables
		G02EEF	Fits a linear regression model by forward selection
<b>L8c1b</b>	Parameter estimation ( <i>search also class L8c1a</i> )		
<b>L8c1b1</b>	Using raw data		
		G02DAF	Fits a general (multiple) linear regression model
		G02DCF	Add/delete an observation to/from a general linear regression model
		G02DDF	Estimates of linear parameters and general linear regression model from updated model
		G02DEF	Add a new variable to a general linear regression model
		G02DFF	Delete a variable from a general linear regression model

	G02DKF	Estimates and standard errors of parameters of a general linear regression model for given constraints
	G02DNF	Computes estimable function of a general linear regression model and its standard error
<b>L8c1b2</b>	Using correlation data	
	G02CGF	Multiple linear regression, from correlation coefficients, with constant term
	G02CHF	Multiple linear regression, from correlation-like coefficients, without constant term
<b>L8c1c</b>	Analysis ( <i>search also classes L8c1a and L8c1b</i> )	
	G02FAF	Calculates standardized residuals and influence statistics
<b>L8c1d</b>	Inference ( <i>search also classes L8c1a and L8c1b</i> )	
	G02DNF	Computes estimable function of a general linear regression model and its standard error
	G02FCF	Computes Durbin–Watson test statistic
<b>L8c2</b>	Several regressions	
	G02DGF	Fits a general linear regression model for new dependent variable
<b>L8c4</b>	Robust	
	G02HAF	Robust regression, standard $M$ -estimates
	G02HBF	Robust regression, compute weights for use with G02HDF
	G02HDF	Robust regression, compute regression with user-supplied functions and weights
	G02HFF	Robust regression, variance-covariance matrix following G02HDF
<b>L8c6</b>	Models based on ranks	
	G08RAF	Regression using ranks, uncensored data
	G08RBF	Regression using ranks, right-censored data
<b>L8e</b>	Nonlinear (i.e., $y = F(X, b)$ ) ( <i>search also class L8h</i> )	
	G02GBF	Fits a generalized linear model with binomial errors
	G02GCF	Fits a generalized linear model with Poisson errors
	G02GDF	Fits a generalized linear model with gamma errors
	G02GKF	Estimates and standard errors of parameters of a general linear model for given constraints
	G02GNF	Computes estimable function of a generalized linear model and its standard error
<b>L8e1</b>	Ordinary least squares	
<b>L8e1b</b>	Parameter estimation ( <i>search also class L8e1a</i> )	
	E04YCF	Covariance matrix for nonlinear least-squares problem (unconstrained)
	G02GAF	Fits a generalized linear model with Normal errors
<b>L8e1b1</b>	Unweighted data, user provides no derivatives	
	E04FCF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using function values only (comprehensive)
	E04FYF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using function values only (easy-to-use)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>L8e1b2</b>	Unweighted data, user provides derivatives	
	E04GBF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and quasi-Newton algorithm using first derivatives (comprehensive)
	E04GDF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using first derivatives (comprehensive)
	E04GYF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and quasi-Newton algorithm, using first derivatives (easy-to-use)
	E04GZF	Unconstrained minimum of a sum of squares, combined Gauss–Newton and modified Newton algorithm using first derivatives (easy-to-use)
	E04UNF	Minimum of a sum of squares, nonlinear constraints, sequential QP method, using function values and optionally first derivatives (comprehensive)
<b>L8g</b>	Spline (i.e., piecewise polynomial)	
	E02BAF	Least-squares curve cubic spline fit (including interpolation)
	E02BEF	Least-squares cubic spline curve fit, automatic knot placement
	G10ABF	Fit cubic smoothing spline, smoothing parameter given
	G10ACF	Fit cubic smoothing spline, smoothing parameter estimated
<b>L8h</b>	EDA (e.g., smoothing)	
	G10CAF	Compute smoothed data sequence using running median smoothers
<b>L8i</b>	Service routines (e.g., matrix manipulation for variable selection)	
	G02CEF	Service routines for multiple linear regression, select elements from vectors and matrices
	G02CFF	Service routines for multiple linear regression, re-order elements of vectors and matrices
	G04EAF	Computes orthogonal polynomials or dummy variables for factor/classification variable
	G10ZAF	Reorder data to give ordered distinct observations
<b>L9</b>	Categorical data analysis	
	G11BAF	Computes multiway table from set of classification factors using selected statistic
	G11BBF	Computes multiway table from set of classification factors using given percentile/quantile
	G11BCF	Computes marginal tables for multiway table computed by G11BAF or G11BBF

		G11CAF	Returns parameter estimates for the conditional analysis of stratified data
		G12ZAF	Creates the risk sets associated with the Cox proportional hazards model for fixed covariates
<b>L9b</b>	Two-way tables ( <i>search also class L9d</i> )		
		G01AFF	Two-way contingency table analysis, with $\chi^2$ /Fisher's exact test
		G11AAF	$\chi^2$ statistics for two-way contingency table
<b>L9c</b>	Log-linear model		
		G02GCF	Fits a generalized linear model with Poisson errors
		G02GKF	Estimates and standard errors of parameters of a general linear model for given constraints
		G02GNF	Computes estimable function of a generalized linear model and its standard error
<b>L10</b>	Time series analysis ( <i>search also class J</i> )		
<b>L10a</b>	Univariate ( <i>search also classes L3a6 and L3a7</i> )		
<b>L10a1</b>	Transformations		
<b>L10a1c</b>	Filters ( <i>search also class K5</i> )		
<b>L10a1c1</b>	Difference		
		G13AAF	Univariate time series, seasonal and non-seasonal differencing
<b>L10a1c4</b>	Other		
		G13BBF	Multivariate time series, filtering by a transfer function model
<b>L10a2</b>	Time domain analysis		
<b>L10a2a</b>	Summary statistics		
		G13AUF	Computes quantities needed for range-mean or standard deviation-mean plot
<b>L10a2a1</b>	Autocorrelations and autocovariances		
		G13ABF	Univariate time series, sample autocorrelation function
<b>L10a2a2</b>	Partial autocorrelations		
		G13ACF	Univariate time series, partial autocorrelations from autocorrelations
<b>L10a2b</b>	Stationarity analysis ( <i>search also class L10a2a</i> )		
		G13AUF	Computes quantities needed for range-mean or standard deviation-mean plot
<b>L10a2c</b>	Autoregressive models		
<b>L10a2c1</b>	Model identification		
		G13ACF	Univariate time series, partial autocorrelations from autocorrelations
<b>L10a2d</b>	ARMA and ARIMA models (including Box-Jenkins methods)		
<b>L10a2d1</b>	Model identification		
		G13ADF	Univariate time series, preliminary estimation, seasonal ARIMA model
<b>L10a2d2</b>	Parameter estimation		
		G13AEF	Univariate time series, estimation, seasonal ARIMA model (comprehensive)
		G13AFF	Univariate time series, estimation, seasonal ARIMA model (easy-to-use)
		G13ASF	Univariate time series, diagnostic checking of residuals, following G13AEF or G13AFF
		G13BEF	Multivariate time series, estimation of multi-input model
<b>L10a2d3</b>	Forecasting		
		G13AGF	Univariate time series, update state set for forecasting
		G13AHF	Univariate time series, forecasting from state set
		G13AJF	Univariate time series, state set and forecasts, from fully specified seasonal ARIMA model
<b>L10a2e</b>	State-space analysis (e.g., Kalman filtering)		
		G13EAF	Combined measurement and time update, one iteration of Kalman filter, time-varying, square root covariance filter
		G13EBF	Combined measurement and time update, one iteration of Kalman filter, time-invariant, square root covariance filter
<b>L10a2f</b>	Analysis of a locally stationary series		
		G13DXF	Calculates the zeros of a vector autoregressive (or moving average) operator
<b>L10a3</b>	Frequency domain analysis ( <i>search also class J1</i> )		
<b>L10a3a</b>	Spectral analysis		
<b>L10a3a3</b>	Spectrum estimation using the periodogram		
		G13CBF	Univariate time series, smoothed sample spectrum using spectral smoothing by the trapezium frequency (Daniell) window
<b>L10a3a4</b>	Spectrum estimation using the Fourier transform of the autocorrelation function		
		G13CAF	Univariate time series, smoothed sample spectrum using rectangular, Bartlett, Tukey or Parzen lag window
<b>L10b</b>	Two time series ( <i>search also classes L3b3c, L10c, and L10d</i> )		
<b>L10b2</b>	Time domain analysis		
<b>L10b2a</b>	Summary statistics (e.g., cross-correlations)		
		G13BCF	Multivariate time series, cross-correlations
<b>L10b2b</b>	Transfer function models		
		G13BAF	Multivariate time series, filtering (pre-whitening) by an ARIMA model
		G13BDF	Multivariate time series, preliminary estimation of transfer function model
		G13BEF	Multivariate time series, estimation of multi-input model
		G13BGF	Multivariate time series, update state set for forecasting from multi-input model
		G13BHF	Multivariate time series, forecasting from state set of multi-input model
		G13BJF	Multivariate time series, state set and forecasts from fully specified multi-input model

- L10b3** Frequency domain analysis (*search also class J1*)
- L10b3a** Cross-spectral analysis
- L10b3a3** Cross-spectrum estimation using the cross-periodogram
  - G13CDF** Multivariate time series, smoothed sample cross spectrum using spectral smoothing by the trapezium frequency (Daniell) window
- L10b3a4** Cross-spectrum estimation using the Fourier transform of the cross-correlation or cross-covariance function
  - G13CCF** Multivariate time series, smoothed sample cross spectrum using rectangular, Bartlett, Tukey or Parzen lag window
- L10b3a6** Spectral functions
  - G13CEF** Multivariate time series, cross amplitude spectrum, squared coherency, bounds, univariate and bivariate (cross) spectra
  - G13CFF** Multivariate time series, gain, phase, bounds, univariate and bivariate (cross) spectra
  - G13CGF** Multivariate time series, noise spectrum, bounds, impulse response function and its standard error
- L10c** Multivariate time series (*search also classes J1, L3e3 and L10b*)
  - G13DBF** Multivariate time series, multiple squared partial autocorrelations
  - G13DCF** Multivariate time series, estimation of VARMA model
  - G13DJF** Multivariate time series, forecasts and their standard errors
  - G13DKF** Multivariate time series, updates forecasts and their standard errors
  - G13DLF** Multivariate time series, differences and/or transforms (for use before G13DCF)
  - G13DMF** Multivariate time series, sample cross-correlation or cross-covariance matrices
  - G13DNF** Multivariate time series, sample partial lag correlation matrices,  $\chi^2$  statistics and significance levels
  - G13DPF** Multivariate time series, partial autoregression matrices
  - G13DSF** Multivariate time series, diagnostic checking of residuals, following G13DCF
  - G13DXF** Calculates the zeros of a vector autoregressive (or moving average) operator
- L12** Discriminant analysis
  - G03ACF** Performs canonical variate analysis
  - G03DAF** Computes test statistic for equality of within-group covariance matrices and matrices for discriminant analysis
  - G03DBF** Computes Mahalanobis squared distances for group or pooled variance-covariance matrices (for use after G03DAF)
  - G03DCF** Allocates observations to groups according to selected rules (for use after G03DAF)
- L13** Covariance structure models
- L13a** Factor analysis
  - G03BAF** Computes orthogonal rotations for loading matrix, generalized orthomax criterion
  - G03BCF** Computes Procrustes rotations
  - G03CAF** Computes maximum likelihood estimates of the parameters of a factor analysis model, factor loadings, communalities and residual correlations
  - G03CCF** Computes factor score coefficients (for use after G03CAF)
  - G11SAF** Contingency table, latent variable model for binary data
- L13b** Principal components analysis
  - G03AAF** Performs principal component analysis
- L13c** Canonical correlation
  - G03ACF** Performs canonical variate analysis
  - G03ADF** Performs canonical correlation analysis
- L14** Cluster analysis
- L14a** One-way
- L14a1** Unconstrained
- L14a1a** Nested
- L14a1a1** Joining (e.g., single link)
  - G03ECF** Hierarchical cluster analysis
  - G03EHF** Constructs dendrogram (for use after G03ECF)
  - G03EJF** Computes cluster indicator variable (for use after G03ECF)
- L14a1b** Non-nested (e.g., K means)
  - G03EFF** K-means cluster analysis
- L14d** Service routines (e.g., compute distance matrix)
  - G03EAF** Computes distance matrix
- L15** Life testing, survival analysis
  - G11CAF** Returns parameter estimates for the conditional analysis of stratified data
  - G12AAF** Computes Kaplan–Meier (product-limit) estimates of survival probabilities
  - G12BAF** Fits Cox’s proportional hazard model
- L16** Multidimensional scaling
  - G03FAF** Performs principal co-ordinate analysis, classical metric scaling
  - G03FCF** Performs non-metric (ordinal) multidimensional scaling
- M** Simulation, stochastic modelling (*search also classes L6 and L10*)
- N** Data handling (*search also class L2*)
- N1** Input, output
  - X04ACF** Open unit number for reading, writing or appending, and associate unit with named file

		X04ADF	Close file associated with given unit number
		X04BAF	Write formatted record to external file
		X04BBF	Read formatted record from external file
		X04CAF	Print real general matrix (easy-to-use)
		X04CBF	Print real general matrix (comprehensive)
		X04CCF	Print real packed triangular matrix (easy-to-use)
		X04CDF	Print real packed triangular matrix (comprehensive)
		X04CEF	Print real packed banded matrix (easy-to-use)
		X04CFF	Print real packed banded matrix (comprehensive)
		X04DAF	Print complex general matrix (easy-to-use)
		X04DBF	Print complex general matrix (comprehensive)
		X04DCF	Print complex packed triangular matrix (easy-to-use)
		X04DDF	Print complex packed triangular matrix (comprehensive)
		X04DEF	Print complex packed banded matrix (easy-to-use)
		X04DFE	Print complex packed banded matrix (comprehensive)
		X04EAF	Print integer matrix (easy-to-use)
		X04EBF	Print integer matrix (comprehensive)
<b>N4</b>	Storage management (e.g., stacks, heaps, trees)		
		F06EUF	(SGTHR/DGTHR) Gather real sparse vector
		F06EVF	(SGTHRZ/DGTHRZ) Gather and set to zero real sparse vector
		F06EWF	(SSCTR/DSCCTR) Scatter real sparse vector
		F06GUF	(CGTHR/ZGTHR) Gather complex sparse vector
		F06GVF	(CGTHRZ/ZGTHRZ) Gather and set to zero complex sparse vector
		F06GWF	(CSCTR/ZSCTR) Scatter complex sparse vector
<b>N5</b>	Searching		
<b>N5a</b>	Extreme value		
		F06FLF	Elements of real vector with largest and smallest absolute value
		F06JLF	(ISAMAX/IDAMAX) Index, real vector element with largest absolute value
		F06JMF	(ICAMAX/IZAMAX) Index, complex vector element with largest absolute value
		F06KLF	Last non-negligible element of real vector
<b>N6</b>	Sorting		
<b>N6a</b>	Internal		
<b>N6a1</b>	Passive (i.e., construct pointer array, rank)		
		M01DZF	Rank arbitrary data
<b>N6a1a</b>	Integer		
		M01DBF	Rank a vector, integer numbers
		M01DFE	Rank rows of a matrix, integer numbers
		M01DKF	Rank columns of a matrix, integer numbers
<b>N6a1b</b>	Real		
		G01DHF	Ranks, Normal scores, approximate Normal scores or exponential (Savage) scores
		M01DAF	Rank a vector, real numbers
		M01DEF	Rank rows of a matrix, real numbers
		M01DJF	Rank columns of a matrix, real numbers
<b>N6a1c</b>	Character		
		M01DCF	Rank a vector, character data
<b>N6a2</b>	Active		
<b>N6a2a</b>	Integer		
		M01CBF	Sort a vector, integer numbers
<b>N6a2b</b>	Real		
		M01CAF	Sort a vector, real numbers
<b>N6a2c</b>	Character		
		M01CCF	Sort a vector, character data
<b>N8</b>	Permuting		
		F06QJF	Permute rows or columns, real rectangular matrix, permutations represented by an integer array
		F06QKF	Permute rows or columns, real rectangular matrix, permutations represented by a real array
		F06VJF	Permute rows or columns, complex rectangular matrix, permutations represented by an integer array
		F06VKF	Permute rows or columns, complex rectangular matrix, permutations represented by a real array
		M01EAF	Rearrange a vector according to given ranks, real numbers
		M01EBF	Rearrange a vector according to given ranks, integer numbers
		M01ECF	Rearrange a vector according to given ranks, character data
		M01EDF	Rearrange a vector according to given ranks, complex numbers
		M01ZAF	Invert a permutation
		M01ZBF	Check validity of a permutation
		M01ZCF	Decompose a permutation into cycles
<b>P</b>	Computational geometry ( <i>search also classes G and Q</i> )		
		D03MAF	Triangulation of plane region

<b>Q</b>	Graphics ( <i>search also class L3</i> )	
	G01ARF	Constructs a stem and leaf plot
	G01ASF	Constructs a box and whisker plot
<b>R</b>	Service routines	
	A00AAF	Prints details of the NAG Fortran Library implementation
	X05AAF	Return date and time as an array of integers
	X05ABF	Convert array of integers representing date and time to character string
	X05ACF	Compare two character strings representing date and time
	X05BAF	Return the CPU time
<b>R1</b>	Machine-dependent constants	
	X01AAF	Provides the mathematical constant $\pi$
	X01ABF	Provides the mathematical constant $\gamma$ (Euler's Constant)
	X02AHF	The largest permissible argument for sin and cos
	X02AJF	The machine precision
	X02AKF	The smallest positive model number
	X02ALF	The largest positive model number
	X02AMF	The safe range parameter
	X02ANF	The safe range parameter for complex floating-point arithmetic
	X02BBF	The largest representable integer
	X02BEF	The maximum number of decimal digits that can be represented
	X02BHF	The floating-point model parameter, $b$
	X02BJF	The floating-point model parameter, $p$
	X02BKF	The floating-point model parameter $e_{\min}$
	X02BLF	The floating-point model parameter $e_{\max}$
	X02DAF	Switch for taking precautions to avoid underflow
	X02DJF	The floating-point model parameter ROUNDS
<b>R3</b>	Error handling	
<b>R3b</b>	Set unit number for error messages	
	X04AAF	Return or set unit number for error messages
	X04ABF	Return or set unit number for advisory messages
<b>R3c</b>	Other utilities	
	P01ABF	Return value of error indicator/terminate with error message

## References

- [1] Boisvert R F, Howe S E and Kahaner D K (1990) The guide to available mathematical software problem classification scheme. *Report NISTIR 4475* Applied and Computational Mathematics Division, National Institute of Standards and Technology.
- [2] Boisvert R F, Howe S E and Kahaner D K (1985) GAMS — a framework for the management of scientific software. *ACM Trans. Math. Software* **11** 313–355.
- [3] Boisvert R F (1989) The guide to available mathematical software advisory system. *Math. Comput. Simul.* **31** 453–464.