LAPACK Quick Reference Guide to the Driver Routines

Release 3.0

Simple Drivers

Simple Driver Routines for Linear Equations

Matrix Type	Routine						
General	SGESV(	N,	NRHS, A, LDA,	IPIV, B, LDB,		INFO)
	CGESV(	N,	NRHS, A, LDA,	IPIV, B, LDB,		INFO)
General Band	SGBSV(	N, KL, KU,	NRHS, AB, LDAB,	IPIV, B, LDB,		INFO)
	CGBSV(	N, KL, KU,	NRHS, AB, LDAB,	IPIV, B, LDB,		INFO)
General Tridiagonal	SGTSV(	N,	NRHS, DL, D, DU,	B, LDB,		INFO)
	CGTSV(	N,	NRHS, DL, D, DU,	B, LDB,		INFO)
Symmetric/Hermitian Positive Definite	SPOSV(UPLO, N,		NRHS, A, LDA,	B, LDB,		INFO)
	CPOSV(UPLO, N,		NRHS, A, LDA,	B, LDB,		INFO)
Symmetric/Hermitian Positive Definite (Packed Storage)	SPPSV(UPLO, N,		NRHS, AP,	B, LDB,		INFO)
	CPPSV(UPLO, N,		NRHS, AP,	B, LDB,		INFO)
Symmetric/Hermitian Positive Definite Band	SPBSV(UPLO, N, KD,		NRHS, AB, LDAB,	B, LDB,		INFO)
	CPBSV(UPLO, N, KD,		NRHS, AB, LDAB,	B, LDB,		INFO)
Symmetric/Hermitian Positive Definite Tridiagonal	SPTSV(	N,	NRHS, D, E,	B, LDB,		INFO)
	CPTSV(	N,	NRHS, D, E,	B, LDB,		INFO)
Symmetric/Hermitian Indefinite	SSYSV(UPLO, N,		NRHS, A, LDA,	IPIV, B, LDB, WORK, LWORK, INFO)
	CSYSV(UPLO, N,		NRHS, A, LDA,	IPIV, B, LDB, WORK, LWORK, INFO)
	CHESV(UPLO, N,		NRHS, A, LDA,	IPIV, B, LDB, WORK, LWORK, INFO)
Symmetric/Hermitian Indefinite (Packed Storage)	SSPSV(UPLO, N,		NRHS, AP,	IPIV, B, LDB,		INFO)
	CSPSV(UPLO, N,		NRHS, AP,	IPIV, B, LDB,		INFO)
	CHPSV(UPLO, N,		NRHS, AP,	IPIV, B, LDB,		INFO)

Simple Driver Routines for Standard and Generalized Linear Least Squares Problems

Problem Type	Routine		
Solve Using Orthogonal Factor, Assuming Full Rank	SGELS(TRANS, M, N, NRHS, A, LDA, B, LDB,	WORK, LWORK, INFO)
	CGELS(TRANS, M, N, NRHS, A, LDA, B, LDB,	WORK, LWORK, INFO)
Solve LSE Problem Using GRQ	SGGLSE(M, N, P, A, LDA, B, LDB, C, D, X,	WORK, LWORK, INFO)
	CGGLSE(M, N, P, A, LDA, B, LDB, C, D, X,	WORK, LWORK, INFO)
Solve GLM Problem Using GQR	SGGGLM(N, M, P, A, LDA, B, LDB, D, X, Y,	WORK, LWORK, INFO)
	CGGGLM(N, M, P, A, LDA, B, LDB, D, X, Y,	WORK, LWORK, INFO)

Simple and Divide and Conquer Driver Routines for Standard Eigenvalue and Singular Value Problems

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Matrix/Problem Type     Routine
Symmetric/Hermitian     SSYEV(  JOBZ, UPLO,        N,    A, LDA,      W,                    WORK, LWORK,                           INFO )
Eigenvalues/vectors     CHEEV(  JOBZ, UPLO,        N,    A, LDA,      W,                    WORK, LWORK, RWORK,                    INFO )
Divide and Conquer      SSYEVD( JOBZ, UPLO,        N,    A, LDA,      W,                    WORK, LWORK,              IWORK, LIWORK,       INFO )
                        CHEEVD( JOBZ, UPLO,        N,    A, LDA,      W,                    WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK,    INFO )

Symmetric/Hermitian     SSPEV(  JOBZ, UPLO,        N,    AP,         W,     Z, LDZ,         WORK,                                  INFO )
(Packed Storage)        CHPEV(  JOBZ, UPLO,        N,    AP,         W,     Z, LDZ,         WORK,        RWORK,                    INFO )
Eigenvalues/vectors
Divide and Conquer      SSPEVD( JOBZ, UPLO,        N,    AP,         W,     Z, LDZ,         WORK, LWORK,              IWORK, LIWORK,       INFO )
                        CHPEVD( JOBZ, UPLO,        N,    AP,         W,     Z, LDZ,         WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK,    INFO )

Symmetric/Hermitian Band SSBEV(  JOBZ, UPLO,       N, KD, AB, LDAB,  W,     Z, LDZ,         WORK,                                  INFO )
Eigenvalues/vectors     CHBEV(  JOBZ, UPLO,        N, KD, AB, LDAB,  W,     Z, LDZ,         WORK,        RWORK,                    INFO )
Divide and Conquer      SSBEVD( JOBZ, UPLO,        N, KD, AB, LDAB,  W,     Z, LDZ,         WORK, LWORK,              IWORK, LIWORK,       INFO )
                        CHBEVD( JOBZ, UPLO,        N, KD, AB, LDAB,  W,     Z, LDZ,         WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK,    INFO )

Symmetric Tridiagonal   SSTEV(  JOBZ,             N,    D, E,              Z, LDZ,         WORK,                                  INFO )
Eigenvalues/vectors
Divide and Conquer      SSTEVD( JOBZ,             N,    D, E,              Z, LDZ,         WORK, LWORK,              IWORK, LIWORK,       INFO )

General                 SGEES( JOBVS, SORT, SELECT, N,  A, LDA, SDIM, WR, WI, VS, LDVS,     WORK, LWORK,                  BWORK, INFO )
Schur Factorization     CGEES( JOBVS, SORT, SELECT, N,  A, LDA, SDIM, W,      VS, LDVS,     WORK, LWORK, RWORK,          BWORK, INFO )

General                 SGEEV( JOBVL, JOBVR,       N,   A, LDA,      WR, WI, VL, LDVL, VR, LDVR, WORK, LWORK,                      INFO )
Eigenvalues/vectors     CGEEV( JOBVL, JOBVR,       N,   A, LDA,      W,      VL, LDVL, VR, LDVR, WORK, LWORK, RWORK,               INFO )

General                 SGESVD( JOBU, JOBVT,   M, N,   A, LDA,     S,   U, LDU, VT, LDVT, WORK, LWORK,                            INFO )
Singular Values/Vectors CGESVD( JOBU, JOBVT,   M, N,   A, LDA,     S,   U, LDU, VT, LDVT, WORK, LWORK, RWORK,                     INFO )
Divide and Conquer      SGESDD( JOBZ,          M, N,   A, LDA,     S,   U, LDU, VT, LDVT, WORK, LWORK,          IWORK,            INFO )
                        CGESDD( JOBZ,          M, N,   A, LDA,     S,   U, LDU, VT, LDVT, WORK, LWORK, RWORK,   IWORK,            INFO )
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Simple and Divide and Conquer Driver Routines for Generalized Eigenvalue and Singular Value Problems

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Matrix/Problem Type     Routine
Symmetric-definite      SSYGV(  ITYPE, JOBZ, UPLO,   N, A, LDA, B, LDB,      W,                           WORK, LWORK,                           INFO )
Eigenvalues/vectors     CHEGV(  ITYPE, JOBZ, UPLO,   N, A, LDA, B, LDB,      W,                           WORK, LWORK, RWORK,                    INFO )
Divide and Conquer      SSYGVD( ITYPE, JOBZ, UPLO,   N, A, LDA, B, LDB,      W,                           WORK, LWORK,              IWORK, LIWORK, INFO )
                        CHEGVD( ITYPE, JOBZ, UPLO,   N, A, LDA, B, LDB,      W,                           WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK, INFO )

Symmetric-definite      SSPGV(  ITYPE, JOBZ, UPLO,   N, AP,    BP,       W,        Z, LDZ,                WORK,                                  INFO )
(Packed Storage)        CHPGV(  ITYPE, JOBZ, UPLO,   N, AP,    BP,       W,        Z, LDZ,                WORK,        RWORK,                    INFO )
Eigenvalues/vectors
Divide and Conquer      SSPGVD( ITYPE, JOBZ, UPLO,   N, AP,    BP,       W,        Z, LDZ,                WORK, LWORK,              IWORK, LIWORK, INFO )
                        CHPGVD( ITYPE, JOBZ, UPLO,   N, AP,    BP,       W,        Z, LDZ,                WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK, INFO )

Symmetric-definite      SSBGV(        JOBZ, UPLO,    N, KA, KB, AB, LDAB, BB, LDBB, W,     Z, LDZ,         WORK,                                  INFO )
(Band Storage)          CHBGV(        JOBZ, UPLO,    N, KA, KB, AB, LDAB, BB, LDBB, W,     Z, LDZ,         WORK,        RWORK,                    INFO )
Eigenvalues/vectors
Divide and Conquer      SSBGVD(       JOBZ, UPLO,    N, KA, KB, AB, LDAB, BB, LDBB, W,     Z, LDZ,         WORK, LWORK,              IWORK, LIWORK, INFO )
                        CHBGVD(       JOBZ, UPLO,    N, KA, KB, AB, LDAB, BB, LDBB, W,     Z, LDZ,         WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK, INFO )

General                 SGGES( JOBVSL, JOBVSR, SORT, SELCTG, N, A, LDA,  B, LDB, SDIM, ALPHAR, ALPHAI, BETA, VSL, LDVSL, VSR, LDVSR, WORK, LWORK,              BWORK,  INFO )
Schur Factorization     CGGES( JOBVSL, JOBVSR, SORT, SELCTG, N, A, LDA,  B, LDB, SDIM, ALPHA,          BETA, VSL, LDVSL, VSR, LDVSR, WORK, LWORK, RWORK,       BWORK,  INFO )

General                 SGGEV( JOBVL,  JOBVR,        N, A, LDA,  B, LDB,      ALPHAR, ALPHAI, BETA, VL, LDVL, VR, LDVR,  WORK, LWORK,                      INFO )
Eigenvalues/vectors     CGGEV( JOBVL,  JOBVR,        N, A, LDA,  B, LDB,      ALPHA,          BETA, VL, LDVL, VR, LDVR,  WORK, LWORK, RWORK,               INFO )

General                 SGGSVD( JOBU, JOBV, JOBQ, M, N, P, K, L, A, LDA, B, LDB,  ALPHA,            BETA, U, LDU, V, LDV, Q, LDQ, WORK,              IWORK,          INFO )
Singular Values/Vectors CGGSVD( JOBU, JOBV, JOBQ, M, N, P, K, L, A, LDA, B, LDB,  ALPHA,            BETA, U, LDU, V, LDV, Q, LDQ, WORK,        RWORK, IWORK,          INFO )
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Expert Drivers

Expert Driver Routines for Linear Equations

Matrix Type	Routine

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General                      SGESVX( FACT, TRANS, N,         NRHS, A, LDA,    AF, LDAF,   IPIV, EQUED, R, C, B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
                             CGESVX( FACT, TRANS, N,         NRHS, A, LDA,    AF, LDAF,   IPIV, EQUED, R, C, B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

General Band                 SGBSVX( FACT, TRANS, N, KL, KU, NRHS, AB, LDAB,  AFB, LDAFB, IPIV, EQUED, R, C, B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
                             CGBSVX( FACT, TRANS, N, KL, KU, NRHS, AB, LDAB,  AFB, LDAFB, IPIV, EQUED, R, C, B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

General Tridiagonal          SGTSVX( FACT, TRANS, N,         NRHS, DL, D, DU, DLF, DF, DUF, DU2, IPIV,        B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
                             CGTSVX( FACT, TRANS, N,         NRHS, DL, D, DU, DLF, DF, DUF, DU2, IPIV,        B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

Symmetric/Hermitian          SPOSVX( FACT, UPLO,  N,         NRHS, A, LDA,    AF, LDAF,         EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
Positive Definite            CPOSVX( FACT, UPLO,  N,         NRHS, A, LDA,    AF, LDAF,         EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

Symmetric/Hermitian          SPPSVX( FACT, UPLO,  N,         NRHS, AP,        AFP,              EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
Positive Definite (Packed Storage)   CPPSVX( FACT, UPLO,  N,         NRHS, AP,        AFP,              EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

Symmetric/Hermitian          SPBSVX( FACT, UPLO,  N, KD,     NRHS, AB, LDAB,  AFB, LDAFB,       EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
Positive Definite Band       CPBSVX( FACT, UPLO,  N, KD,     NRHS, AB, LDAB,  AFB, LDAFB,       EQUED, S,     B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

Symmetric/Hermitian          SPTSVX( FACT,        N,         NRHS, D, E,      DF, EF,                         B, LDB, X, LDX, RCOND, FERR, BERR, WORK,               INFO )
Positive Definite Tridiagonal   CPTSVX( FACT,        N,         NRHS, D, E,      DF, EF,                         B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )

Symmetric/Hermitian          SSYSVX( FACT, UPLO,  N,         NRHS, A, LDA,    AF, LDAF, IPIV,                 B, LDB, X, LDX, RCOND, FERR, BERR, WORK, LWORK, IWORK, INFO )
Indefinite                   CSYSVX( FACT, UPLO,  N,         NRHS, A, LDA,    AF, LDAF, IPIV,                 B, LDB, X, LDX, RCOND, FERR, BERR, WORK, LWORK, RWORK, INFO )
                             CHESVX( FACT, UPLO,  N,         NRHS, A, LDA,    AF, LDAF, IPIV,                 B, LDB, X, LDX, RCOND, FERR, BERR, WORK, LWORK, RWORK, INFO )

Symmetric/Hermitian          SSPSVX( FACT, UPLO,  N,         NRHS, AP,        AFP, IPIV,                      B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        IWORK, INFO )
Indefinite (Packed Storage)  CSPSVX( FACT, UPLO,  N,         NRHS, AP,        AFP, IPIV,                      B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )
                             CHPSVX( FACT, UPLO,  N,         NRHS, AP,        AFP, IPIV,                      B, LDB, X, LDX, RCOND, FERR, BERR, WORK,        RWORK, INFO )
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Divide and Conquer and Expert Driver Routines for Linear Least Squares Problems

Problem Type	Routine

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Solve Using Orthogonal Factor   SGELSY( M, N, NRHS, A, LDA, B, LDB, JPVT, RCOND, RANK, WORK, LWORK,              INFO )
                                CGELSY( M, N, NRHS, A, LDA, B, LDB, JPVT, RCOND, RANK, WORK, LWORK, RWORK,       INFO )

Solve Using SVD,                SGELSS( M, N, NRHS, A, LDA, B, LDB,       S, RCOND, RANK, WORK, LWORK,              INFO )
Allowing for Rank-Deficiency    CGELSS( M, N, NRHS, A, LDA, B, LDB,       S, RCOND, RANK, WORK, LWORK, RWORK,       INFO )

Solve Using D&C SVD,            SGELSD( M, N, NRHS, A, LDA, B, LDB,       S, RCOND, RANK, WORK, LWORK,        IWORK, INFO )
Allowing for Rank-Deficiency    CGELSD( M, N, NRHS, A, LDA, B, LDB,       S, RCOND, RANK, WORK, LWORK, RWORK, IWORK, INFO )
```

Expert and RRR Driver Routines for Standard and Generalized Symmetric Eigenvalue Problems

Matrix/Problem Type	Routine
Symmetric/Hermitian Eigenvalues/vectors	`SSYEVX( JOBZ, RANGE, UPLO, N,       A, LDA,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,              WORK, LWORK,              IWORK, IFAIL, INFO )`
	`CHEEVX( JOBZ, RANGE, UPLO, N,       A, LDA,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,              WORK, LWORK, RWORK,       IWORK, IFAIL, INFO )`
	`SSYEVR( JOBZ, RANGE, UPLO, N,       A, LDA,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       ISUPPZ, WORK, LWORK,              IWORK, LIWORK, INFO )`
	`CHEEVR( JOBZ, RANGE, UPLO, N,       A, LDA,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       ISUPPZ, WORK, LWORK, RWORK, LRWORK, IWORK, LIWORK, INFO )`
	`SSYGVX( ITYPE, JOBZ, RANGE, UPLO, N,       A, LDA, B, LDB,   VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK, LWORK,              IWORK, IFAIL, INFO )`
	`CHEGVX( ITYPE, JOBZ, RANGE, UPLO, N,       A, LDA, B, LDB,   VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK, LWORK, RWORK,       IWORK, IFAIL, INFO )`
Symmetric/Hermitian (Packed Storage) Eigenvalues/vectors	`SSPEVX( JOBZ, RANGE, UPLO, N,       AP,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,              IWORK, IFAIL, INFO )`
	`CHPEVX( JOBZ, RANGE, UPLO, N,       AP,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,       RWORK,       IWORK, IFAIL, INFO )`
	`SSPGVX( ITYPE, JOBZ, RANGE, UPLO, N,       AP, BP,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,              IWORK, IFAIL, INFO )`
	`CHPGVX( ITYPE, JOBZ, RANGE, UPLO, N,       AP, BP,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,       RWORK,       IWORK, IFAIL, INFO )`
Symmetric/Hermitian Band Eigenvalues/vectors	`SSBEVX( JOBZ, RANGE, UPLO, N, KD, AB, LDAB, Q, LDQ, VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,              IWORK, IFAIL, INFO )`
	`CHBEVX( JOBZ, RANGE, UPLO, N, KD, AB, LDAB, Q, LDQ, VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,       RWORK,       IWORK, IFAIL, INFO )`
	`SSBGVX( JOBZ, RANGE, UPLO, N, KA, KB, AB, LDAB, BB, LDBB, Q, LDQ, VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ, WORK,              IWORK, IFAIL, INFO )`
	`CHBGVX( JOBZ, RANGE, UPLO, N, KA, KB, AB, LDAB, BB, LDBB, Q, LDQ, VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ, WORK,       RWORK,       IWORK, IFAIL, INFO )`
Symmetric Tridiagonal Eigenvalues/vectors	`SSTEVX( JOBZ, RANGE,       N,    D, E,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       WORK,              IWORK, IFAIL, INFO )`
	`SSTEVR( JOBZ, RANGE,       N,    D, E,              VL, VU, IL, IU, ABSTOL, M, W, Z, LDZ,       ISUPPZ, WORK, LWORK,              IWORK, LIWORK, INFO )`

Expert Driver Routines for Standard and Generalized Nonsymmetric Eigenvalue Problems

Problem Type	Routine
Schur Factorization	`SGEESX( JOBVS, SORT, SELECT, SENSE, N, A, LDA, SDIM, WR, WI, VS, LDVS,              RCONDE, RCONDV,              WORK, LWORK,       IWORK, LIWORK, BWORK, INFO )`
	`CGEESX( JOBVS, SORT, SELECT, SENSE, N, A, LDA, SDIM, W,       VS, LDVS,              RCONDE, RCONDV,              WORK, LWORK, RWORK,              BWORK, INFO )`
	`SGGESX( JOBVSL, JOBVSR, SORT, SELCTG, SENSE,  N, A, LDA, B, LDB, SDIM, ALPHAR, ALPHAI, BETA, VSL, LDVSL, VSR, LDVSR, RCONDE, RCONDV,   WORK, LWORK,       IWORK, LIWORK, BWORK, INFO )`
	`CGGESX( JOBVSL, JOBVSR, SORT, SELCTG, SENSE,  N, A, LDA, B, LDB, SDIM, ALPHAR, ALPHAI, BETA, VSL, LDVSL, VSR, LDVSR, RCONDE, RCONDV,   WORK, LWORK, RWORK, IWORK, LIWORK, BWORK, INFO )`
Eigenvalues/ vectors	`SGEEVX( BALANC, JOBVL, JOBVR, SENSE, N, A, LDA,       WR, WI, VL, LDVL, VR, LDVR, ILO, IHI, SCALE, ABNRM, RCONDE, RCONDV,              WORK, LWORK,       IWORK,        INFO )`
	`CGEEVX( BALANC, JOBVL, JOBVR, SENSE, N, A, LDA,       W,       VL, LDVL, VR, LDVR, ILO, IHI, SCALE, ABNRM, RCONDE, RCONDV,              WORK, LWORK, RWORK,              INFO )`
	`SGGEVX( BALANC, JOBVL, JOBVR, SENSE, N, A, LDA, B, LDB, ALPHAR, ALPHAI, BETA, VL, LDVL, VR, LDVR, ILO, IHI, LSCALE, RSCALE, ABNRM, BBNRM, RCONDE, RCONDV, WORK, LWORK,       IWORK, BWORK, INFO )`
	`CGGEVX( BALANC, JOBVL, JOBVR, SENSE, N, A, LDA, B, LDB, ALPHAR, ALPHAI, BETA, VL, LDVL, VR, LDVR, ILO, IHI, LSCALE, RSCALE, ABNRM, BBNRM, RCONDE, RCONDV, WORK, LWORK, RWORK, IWORK, BWORK, INFO )`

Meaning of prefixes

Routines beginning with "S" are available in:

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S - REAL
D - DOUBLE PRECISION
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Routines beginning with "C" are available in:

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C - COMPLEX
Z - COMPLEX*16
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Note: COMPLEX*16 may not be supported by all machines