

# NAG Library Chapter Contents

## F07 – Linear Equations (LAPACK)

F07 Chapter Introduction

<b>Routine Name</b>	<b>Mark of Introduction</b>	<b>Purpose</b>
F07AAF	21	DGESV Computes the solution to a real system of linear equations
F07ABF	21	DGESVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real system of linear equations
F07ACF	22	DSGESV Mixed precision real system solver
F07ADF	15	DGETRF <i>LU</i> factorization of real <i>m</i> by <i>n</i> matrix
F07AEF	15	DGETRS Solution of real system of linear equations, multiple right-hand sides, matrix already factorized by F07ADF (DGETRF)
F07AFF	21	DGEEQU Computes row and column scalings intended to equilibrate a general real matrix and reduce its condition number
F07AGF	15	DGECON Estimate condition number of real matrix, matrix already factorized by F07ADF (DGETRF)
F07AHF	15	DGERFS Refined solution with error bounds of real system of linear equations, multiple right-hand sides
F07AJF	15	DGETRI Inverse of real matrix, matrix already factorized by F07ADF (DGETRF)
F07ANF	21	ZGESV Computes the solution to a complex system of linear equations
F07APF	21	ZGESVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex system of linear equations
F07AQF	22	ZCGESV Mixed precision complex system solver
F07ARF	15	ZGETRF <i>LU</i> factorization of complex <i>m</i> by <i>n</i> matrix
F07ASF	15	ZGETRS Solution of complex system of linear equations, multiple right-hand sides, matrix already factorized by F07ARF (ZGETRF)
F07ATF	21	ZGEEQU Computes row and column scalings intended to equilibrate a general complex matrix and reduce its condition number

F07AUF	15	ZGECON Estimate condition number of complex matrix, matrix already factorized by F07ARF (ZGETRF)
F07AVF	15	ZGERFS Refined solution with error bounds of complex system of linear equations, multiple right-hand sides
F07AWF	15	ZGETRI Inverse of complex matrix, matrix already factorized by F07ARF (ZGETRF)
F07BAF	21	DGBSV Computes the solution to a real banded system of linear equations
F07BBF	21	DGBSVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real banded system of linear equations
F07BDF	15	DGBTRF <i>LU</i> factorization of real $m$ by $n$ band matrix
F07BEF	15	DGBTRS Solution of real band system of linear equations, multiple right-hand sides, matrix already factorized by F07BDF (DGBTRF)
F07BFF	21	DGBEQU Computes row and column scalings intended to equilibrate a real banded matrix and reduce its condition number
F07BGF	15	DGBCON Estimate condition number of real band matrix, matrix already factorized by F07BDF (DGBTRF)
F07BHF	15	DGBRFS Refined solution with error bounds of real band system of linear equations, multiple right-hand sides
F07BNF	21	ZGBSV Computes the solution to a complex banded system of linear equations
F07BPF	21	ZGBSVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex banded system of linear equations
F07BRF	15	ZGBTRF <i>LU</i> factorization of complex $m$ by $n$ band matrix
F07BSF	15	ZGBTRS Solution of complex band system of linear equations, multiple right-hand sides, matrix already factorized by F07BRF (ZGBTRF)
F07BTF	21	ZGBEQU Computes row and column scalings intended to equilibrate a complex banded matrix and reduce its condition number
F07BUF	15	ZGBCON Estimate condition number of complex band matrix, matrix already factorized by F07BRF (ZGBTRF)
F07BVF	15	ZGBRFS Refined solution with error bounds of complex band system of linear equations, multiple right-hand sides
F07CAF	21	DGTSV Computes the solution to a real tridiagonal system of linear equations

F07CBF	21	DGTSVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real tridiagonal system of linear equations
F07CDF	21	DGTTRF <i>LU</i> factorization of real tridiagonal matrix
F07CEF	21	DGTTRS Solves a real tridiagonal system of linear equations using the <i>LU</i> factorization computed by F07CDF (DGTTRF)
F07CGF	21	DGTCON Estimates the reciprocal of the condition number of a real tridiagonal matrix using the <i>LU</i> factorization computed by F07CDF (DGTTRF)
F07CHF	21	DGTRFS Refined solution with error bounds of real tridiagonal system of linear equations, multiple right-hand sides
F07CNF	21	ZGTSV Computes the solution to a complex tridiagonal system of linear equations
F07CPF	21	ZGTSVX Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex tridiagonal system of linear equations
F07CRF	21	ZGTTRF <i>LU</i> factorization of complex tridiagonal matrix
F07CSF	21	ZGTTRS Solves a complex tridiagonal system of linear equations using the <i>LU</i> factorization computed by F07CDF (DGTTRF)
F07CUF	21	ZGTCON Estimates the reciprocal of the condition number of a complex tridiagonal matrix using the <i>LU</i> factorization computed by F07CDF (DGTTRF)
F07CVF	21	ZGTRFS Refined solution with error bounds of complex tridiagonal system of linear equations, multiple right-hand sides
F07FAF	21	DPOSV Computes the solution to a real symmetric positive-definite system of linear equations
F07FBF	21	DPOSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite system of linear equations
F07FDF	15	DPOTRF Cholesky factorization of real symmetric positive-definite matrix
F07FEF	15	DPOTRS Solution of real symmetric positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07FDF (DPOTRF)
F07FFF	21	DPOEQU Computes row and column scalings intended to equilibrate a real symmetric positive-definite matrix and reduce its condition number
F07FGF	15	DPOCON Estimate condition number of real symmetric positive-definite matrix, matrix already factorized by F07FDF (DPOTRF)

F07FHF	15	DPORFS Refined solution with error bounds of real symmetric positive-definite system of linear equations, multiple right-hand sides
F07FJF	15	DPOTRI Inverse of real symmetric positive-definite matrix, matrix already factorized by F07FDF (DPOTRF)
F07FNF	21	ZPOSV Computes the solution to a complex Hermitian positive-definite system of linear equations
F07FPF	21	ZPOSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite system of linear equations
F07FRF	15	ZPOTRF Cholesky factorization of complex Hermitian positive-definite matrix
F07FSF	15	ZPOTRS Solution of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07FRF (ZPOTRF)
F07FTF	21	ZPOEQU Computes row and column scalings intended to equilibrate a complex Hermitian positive-definite matrix and reduce its condition number
F07FUF	15	ZPOCON Estimate condition number of complex Hermitian positive-definite matrix, matrix already factorized by F07FRF (ZPOTRF)
F07FVF	15	ZPORFS Refined solution with error bounds of complex Hermitian positive-definite system of linear equations, multiple right-hand sides
F07FWF	15	ZPOTRI Inverse of complex Hermitian positive-definite matrix, matrix already factorized by F07FRF (ZPOTRF)
F07GAF	21	DPPSV Computes the solution to a real symmetric positive-definite system of linear equations, packed storage
F07GBF	21	DPPSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite system of linear equations, packed storage
F07GDF	15	DPPTRF Cholesky factorization of real symmetric positive-definite matrix, packed storage
F07GEF	15	DPPTRS Solution of real symmetric positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07GDF (DPPTRF), packed storage
F07GFF	21	DPPEQU Computes row and column scalings intended to equilibrate a real symmetric positive-definite matrix and reduce its condition number, packed storage
F07GGF	15	DPPCON Estimate condition number of real symmetric positive-definite matrix, matrix already factorized by F07GDF (DPPTRF), packed storage

F07GHF	15	DPPRFS Refined solution with error bounds of real symmetric positive-definite system of linear equations, multiple right-hand sides, packed storage
F07GJF	15	DPPTRI Inverse of real symmetric positive-definite matrix, matrix already factorized by F07GDF (DPPTRF), packed storage
F07GNF	21	ZPPSV Computes the solution to a complex Hermitian positive-definite system of linear equations, packed storage
F07GPF	21	ZPPSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite system of linear equations, packed storage
F07GRF	15	ZPPTRF Cholesky factorization of complex Hermitian positive-definite matrix, packed storage
F07GSF	15	ZPPTRS Solution of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, matrix already factorized by F07GRF (ZPPTRF), packed storage
F07GTF	21	ZPPEQU Computes row and column scalings intended to equilibrate a complex Hermitian positive-definite matrix and reduce its condition number, packed storage
F07GUF	15	ZPPCON Estimate condition number of complex Hermitian positive-definite matrix, matrix already factorized by F07GRF (ZPPTRF), packed storage
F07GVF	15	ZPPRFS Refined solution with error bounds of complex Hermitian positive-definite system of linear equations, multiple right-hand sides, packed storage
F07GWF	15	ZPPTRI Inverse of complex Hermitian positive-definite matrix, matrix already factorized by F07GRF (ZPPTRF), packed storage
F07HAF	21	DPBSV Computes the solution to a real symmetric positive-definite banded system of linear equations
F07HBF	21	DPBSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite banded system of linear equations
F07HDF	15	DPBTRF Cholesky factorization of real symmetric positive-definite band matrix
F07HEF	15	DPBTRS Solution of real symmetric positive-definite band system of linear equations, multiple right-hand sides, matrix already factorized by F07HDF (DPBTRF)
F07HFF	21	DPBEQU Computes row and column scalings intended to equilibrate a real symmetric positive-definite banded matrix and reduce its condition number
F07HGF	15	DPBCON Estimate condition number of real symmetric positive-definite band matrix, matrix already factorized by F07HDF (DPBTRF)

F07HHF	15	DPBRFS Refined solution with error bounds of real symmetric positive-definite band system of linear equations, multiple right-hand sides
F07HNF	21	ZPBSV Computes the solution to a complex Hermitian positive-definite banded system of linear equations
F07HPF	21	ZPBSVX Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite banded system of linear equations
F07HRF	15	ZPBTRF Cholesky factorization of complex Hermitian positive-definite band matrix
F07HSF	15	ZPBTRS Solution of complex Hermitian positive-definite band system of linear equations, multiple right-hand sides, matrix already factorized by F07HRF (ZPBTRF)
F07HTF	21	ZPBEQU Computes row and column scalings intended to equilibrate a complex Hermitian positive-definite banded matrix and reduce its condition number
F07HUF	15	ZPBCON Estimate condition number of complex Hermitian positive-definite band matrix, matrix already factorized by F07HRF (ZPBTRF)
F07HVF	15	ZPBRFS Refined solution with error bounds of complex Hermitian positive-definite band system of linear equations, multiple right-hand sides
F07JAF	21	DPTSV Computes the solution to a real symmetric positive-definite tridiagonal system of linear equations
F07JBF	21	DPTS VX Uses the modified Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite tridiagonal system of linear equations
F07JDF	21	DPTTRF Computes the modified Cholesky factorization of a real symmetric positive-definite tridiagonal matrix
F07JEF	21	DPTTRS Solves a real symmetric positive-definite tridiagonal system using the modified Cholesky factorization computed by F07JDF (DPTTRF)
F07JGF	21	DPTCON Computes the reciprocal of the condition number of a real symmetric positive-definite tridiagonal system using the modified Cholesky factorization computed by F07JDF (DPTTRF)
F07JHF	21	DPTRFS Refined solution with error bounds of real symmetric positive-definite tridiagonal system of linear equations, multiple right-hand sides
F07JNF	21	ZPTS V Computes the solution to a complex Hermitian positive-definite tridiagonal system of linear equations

F07JPF	21	ZPTSVX Uses the modified Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite tridiagonal system of linear equations
F07JRF	21	ZPTTRF Computes the modified Cholesky factorization of a complex Hermitian positive-definite tridiagonal matrix
F07JSF	21	ZPTTRS Solves a complex Hermitian positive-definite tridiagonal system using the modified Cholesky factorization computed by F07JRF (ZPTTRF)
F07JUF	21	ZPTCON Computes the reciprocal of the condition number of a complex Hermitian positive-definite tridiagonal system using the modified Cholesky factorization computed by F07JRF (ZPTTRF)
F07JVF	21	ZPTRFS Refined solution with error bounds of complex Hermitian positive-definite tridiagonal system of linear equations, multiple right-hand sides
F07MAF	21	DSYSV Computes the solution to a real symmetric system of linear equations
F07MBF	21	DSYSVX Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations
F07MDF	15	DSYTRF Bunch–Kaufman factorization of real symmetric indefinite matrix
F07MEF	15	DSYTRS Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07MDF (DSYTRF)
F07MGF	15	DSYCON Estimate condition number of real symmetric indefinite matrix, matrix already factorized by F07MDF (DSYTRF)
F07MHF	15	DSYRFS Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides
F07MJF	15	DSYTRI Inverse of real symmetric indefinite matrix, matrix already factorized by F07MDF (DSYTRF)
F07MNF	21	ZHESV Computes the solution to a complex Hermitian system of linear equations
F07MPF	21	ZHESVX Uses the diagonal pivoting factorization to compute the solution to a complex Hermitian system of linear equations
F07MRF	15	ZHETRF Bunch–Kaufman factorization of complex Hermitian indefinite matrix
F07MSF	15	ZHETRS Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07MRF (ZHETRF)
F07MUF	15	ZHECON Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by F07MRF (ZHETRF)

F07MVF	15	ZHERFS Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides
F07MWF	15	ZHETRI Inverse of complex Hermitian indefinite matrix, matrix already factorized by F07MRF (ZHETRF)
F07NNF	21	ZSYSV Computes the solution to a complex symmetric system of linear equations
F07NPF	21	ZSYSVX Uses the diagonal pivoting factorization to compute the solution to a complex symmetric system of linear equations
F07NRF	15	ZSYTRF Bunch–Kaufman factorization of complex symmetric matrix
F07NSF	15	ZSYTRS Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by F07NRF (ZSYTRF)
F07NUF	15	ZSYCON Estimate condition number of complex symmetric matrix, matrix already factorized by F07NRF (ZSYTRF)
F07NVF	15	ZSYRFS Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides
F07NWF	15	ZSYTRI Inverse of complex symmetric matrix, matrix already factorized by F07NRF (ZSYTRF)
F07PAF	21	DSPSV Computes the solution to a real symmetric system of linear equations, packed storage
F07PBF	21	DSPSVX Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations, packed storage
F07PDF	15	DSPTRF Bunch–Kaufman factorization of real symmetric indefinite matrix, packed storage
F07PEF	15	DSPTRS Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07PDF (DSPTRF), packed storage
F07PGF	15	DSPCON Estimate condition number of real symmetric indefinite matrix, matrix already factorized by F07PDF (DSPTRF), packed storage
F07PHF	15	DSPRFS Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides, packed storage
F07PJF	15	DSPTRI Inverse of real symmetric indefinite matrix, matrix already factorized by F07PDF (DSPTRF), packed storage
F07PNF	21	ZHPSV Computes the solution to a complex Hermitian system of linear equations, packed storage

F07PPF	21	ZHPSVX Uses the diagonal pivoting factorization to compute the solution to a complex Hermitian system of linear equations, packed storage
F07PRF	15	ZHPTRF Bunch–Kaufman factorization of complex Hermitian indefinite matrix, packed storage
F07PSF	15	ZHPTRS Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by F07PRF (ZHPTRF), packed storage
F07PUF	15	ZHPCON Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by F07PRF (ZHPTRF), packed storage
F07PVF	15	ZHPRFS Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides, packed storage
F07PWF	15	ZHPTRI Inverse of complex Hermitian indefinite matrix, matrix already factorized by F07PRF (ZHPTRF), packed storage
F07QNF	21	ZSPSV Computes the solution to a complex symmetric system of linear equations, packed storage
F07QPF	21	ZSPSVX Uses the diagonal pivoting factorization to compute the solution to a complex symmetric system of linear equations, packed storage
F07QRF	15	ZSPTRF Bunch–Kaufman factorization of complex symmetric matrix, packed storage
F07QSF	15	ZSPTRS Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by F07QRF (ZSPTRF), packed storage
F07QUF	15	ZSPCON Estimate condition number of complex symmetric matrix, matrix already factorized by F07QRF (ZSPTRF), packed storage
F07QVF	15	ZSPRFS Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides, packed storage
F07QWF	15	ZSPTRI Inverse of complex symmetric matrix, matrix already factorized by F07QRF (ZSPTRF), packed storage
F07TEF	15	DTRTRS Solution of real triangular system of linear equations, multiple right-hand sides
F07TGF	15	DTRCON Estimate condition number of real triangular matrix
F07THF	15	DTRRFS Error bounds for solution of real triangular system of linear equations, multiple right-hand sides
F07TJF	15	DTRTRI Inverse of real triangular matrix

F07TSF	15	ZTRTRS Solution of complex triangular system of linear equations, multiple right-hand sides
F07TUF	15	ZTRCON Estimate condition number of complex triangular matrix
F07TVF	15	ZTRRFS Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides
F07TWF	15	ZTRTRI Inverse of complex triangular matrix
F07UEF	15	DTPTRS Solution of real triangular system of linear equations, multiple right-hand sides, packed storage
F07UGF	15	DTPCON Estimate condition number of real triangular matrix, packed storage
F07UHF	15	DTPRFS Error bounds for solution of real triangular system of linear equations, multiple right-hand sides, packed storage
F07UJF	15	DTPTRI Inverse of real triangular matrix, packed storage
F07USF	15	ZTPTRS Solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
F07UUF	15	ZTPCON Estimate condition number of complex triangular matrix, packed storage
F07UVF	15	ZTPRFS Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
F07UWF	15	ZTPTRI Inverse of complex triangular matrix, packed storage
F07VEF	15	DTBTRS Solution of real band triangular system of linear equations, multiple right-hand sides
F07VGF	15	DTBCON Estimate condition number of real band triangular matrix
F07VHF	15	DTBRFS Error bounds for solution of real band triangular system of linear equations, multiple right-hand sides
F07VSF	15	ZTBTRS Solution of complex band triangular system of linear equations, multiple right-hand sides
F07VUF	15	ZTBCON Estimate condition number of complex band triangular matrix
F07VVF	15	ZTBRFS Error bounds for solution of complex band triangular system of linear equations, multiple right-hand sides

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