

## NAG Library Chapter Contents

### f07 – Linear Equations (LAPACK)

f07 Chapter Introduction

Function Name	Mark of Introduction	Purpose
f07aac	23	nag_dgesv Computes the solution to a real system of linear equations
f07abc	23	nag_dgesvx Uses the $LU$ factorization to compute the solution, error-bound and condition estimate for a real system of linear equations
f07acc	23	nag_dsgevs Computes the solution to a real system of linear equations using mixed precision arithmetic
f07adc	7	nag_dgetrf $LU$ factorization of real $m$ by $n$ matrix
f07aec	7	nag_dgetrs Solution of real system of linear equations, multiple right-hand sides, matrix already factorized by nag_dgetrf (f07adc)
f07afc	23	nag_dgeequ Computes row and column scalings intended to equilibrate a general real matrix and reduce its condition number
f07agc	7	nag_dgecon Estimate condition number of real matrix, matrix already factorized by nag_dgetrf (f07adc)
f07ahc	7	nag_dgerfs Refined solution with error bounds of real system of linear equations, multiple right-hand sides
f07ajc	7	nag_dgetri Inverse of real matrix, matrix already factorized by nag_dgetrf (f07adc)
f07anc	23	nag_zgesv Computes the solution to a complex system of linear equations
f07apc	23	nag_zgesvx Uses the $LU$ factorization to compute the solution, error-bound and condition estimate for a complex system of linear equations
f07aqc	23	nag_zcgevs Computes the solution to a complex system of linear equations using mixed precision arithmetic
f07arc	7	nag_zgetrf $LU$ factorization of complex $m$ by $n$ matrix
f07asc	7	nag_zgetrs Solution of complex system of linear equations, multiple right-hand sides, matrix already factorized by nag_zgetrf (f07arc)
f07atc	23	nag_zgeequ Computes row and column scalings intended to equilibrate a general complex matrix and reduce its condition number
f07auc	7	nag_zgecon Estimate condition number of complex matrix, matrix already factorized by nag_zgetrf (f07arc)
f07avc	7	nag_zgerfs Refined solution with error bounds of complex system of linear equations, multiple right-hand sides
f07awc	7	nag_zgetri Inverse of complex matrix, matrix already factorized by nag_zgetrf (f07arc)

f07bac	23	nag_dgbsv Computes the solution to a real banded system of linear equations
f07bbc	23	nag_dgbsvx Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real banded system of linear equations
f07bdc	7	nag_dgbtrf <i>LU</i> factorization of real <i>m</i> by <i>n</i> band matrix
f07bec	7	nag_dgbtrs Solution of real band system of linear equations, multiple right-hand sides, matrix already factorized by nag_dgbtrf (f07bdc)
f07bfc	23	nag_dgbequ Computes row and column scalings intended to equilibrate a real banded matrix and reduce its condition number
f07bgc	7	nag_dgbcon Estimate condition number of real band matrix, matrix already factorized by nag_dgbtrf (f07bdc)
f07bhc	7	nag_dgbrfs Refined solution with error bounds of real band system of linear equations, multiple right-hand sides
f07bnc	23	nag_zgbsv Computes the solution to a complex banded system of linear equations
f07bpc	23	nag_zgbsvx Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex banded system of linear equations
f07brc	7	nag_zgbtrf <i>LU</i> factorization of complex <i>m</i> by <i>n</i> band matrix
f07bsc	7	nag_zgbtrs Solution of complex band system of linear equations, multiple right-hand sides, matrix already factorized by nag_zgbtrf (f07brc)
f07btc	23	nag_zgbequ Computes row and column scalings intended to equilibrate a complex banded matrix and reduce its condition number
f07buc	7	nag_zgbcon Estimate condition number of complex band matrix, matrix already factorized by nag_zgbtrf (f07brc)
f07bvc	7	nag_zgbrfs Refined solution with error bounds of complex band system of linear equations, multiple right-hand sides
f07cac	23	nag_dgtsv Computes the solution to a real tridiagonal system of linear equations
f07cbc	23	nag_dgtsvx Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real tridiagonal system of linear equations
f07cdc	23	nag_dgttrf <i>LU</i> factorization of real tridiagonal matrix
f07cec	23	nag_dgttrs Solves a real tridiagonal system of linear equations using the <i>LU</i> factorization computed by nag_dgttrf (f07cdc)
f07cgc	23	nag_dgtcon Estimates the reciprocal of the condition number of a real tridiagonal matrix using the <i>LU</i> factorization computed by nag_dgttrf (f07cdc)
f07chc	23	nag_dgtfrs Refined solution with error bounds of real tridiagonal system of linear equations, multiple right-hand sides
f07cnc	23	nag_zgtsv Computes the solution to a complex tridiagonal system of linear equations
f07cpc	23	nag_zgtsvx Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex tridiagonal system of linear equations

f07crc	23	nag_zgttrf <i>LU</i> factorization of complex tridiagonal matrix
f07csc	23	nag_zgttrs Solves a complex tridiagonal system of linear equations using the <i>LU</i> factorization computed by nag_dgttrf (f07cdc)
f07cuc	23	nag_zgtcon Estimates the reciprocal of the condition number of a complex tridiagonal matrix using the <i>LU</i> factorization computed by nag_dgttrf (f07cdc)
f07cvc	23	nag_zgtfrs Refined solution with error bounds of complex tridiagonal system of linear equations, multiple right-hand sides
f07fac	23	nag_dposv Computes the solution to a real symmetric positive definite system of linear equations
f07fbc	23	nag_dposvx Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive definite system of linear equations
f07fdc	7	nag_dpotrf Cholesky factorization of real symmetric positive definite matrix
f07fec	7	nag_dpotsr Solution of real symmetric positive definite system of linear equations, multiple right-hand sides, matrix already factorized by nag_dpotrf (f07fdc)
f07ffc	23	nag_dpoequ Computes row and column scalings intended to equilibrate a real symmetric positive definite matrix and reduce its condition number
f07fgc	7	nag_dpocon Estimate condition number of real symmetric positive definite matrix, matrix already factorized by nag_dpotrf (f07fdc)
f07fhc	7	nag_dporfs Refined solution with error bounds of real symmetric positive definite system of linear equations, multiple right-hand sides
f07fjc	7	nag_dpstri Inverse of real symmetric positive definite matrix, matrix already factorized by nag_dpotrf (f07fdc)
f07fnc	23	nag_zposv Computes the solution to a complex Hermitian positive definite system of linear equations
f07fpc	23	nag_zposvx Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive definite system of linear equations
f07frc	7	nag_zpotrf Cholesky factorization of complex Hermitian positive definite matrix
f07fsc	7	nag_zpotrs Solution of complex Hermitian positive definite system of linear equations, multiple right-hand sides, matrix already factorized by nag_zpotrf (f07frc)
f07ftc	23	nag_zpoequ Computes row and column scalings intended to equilibrate a complex Hermitian positive definite matrix and reduce its condition number
f07fuc	7	nag_zpocon Estimate condition number of complex Hermitian positive definite matrix, matrix already factorized by nag_zpotrf (f07frc)
f07fvc	7	nag_zporfs Refined solution with error bounds of complex Hermitian positive definite system of linear equations, multiple right-hand sides
f07fwc	7	nag_zpstri Inverse of complex Hermitian positive definite matrix, matrix already factorized by nag_zpotrf (f07frc)

f07gac	23	nag_dpssv Computes the solution to a real symmetric positive definite system of linear equations, packed storage
f07gbc	23	nag_dpssvx 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
f07gdc	7	nag_dpptrf Cholesky factorization of real symmetric positive definite matrix, packed storage
f07gec	7	nag_dpptrs Solution of real symmetric positive definite system of linear equations, multiple right-hand sides, matrix already factorized by nag_dpptrf (f07gdc), packed storage
f07gfc	23	nag_dppequ Computes row and column scalings intended to equilibrate a real symmetric positive definite matrix and reduce its condition number, packed storage
f07ggc	7	nag_dppcon Estimate condition number of real symmetric positive definite matrix, matrix already factorized by nag_dpptrf (f07gdc), packed storage
f07ghc	7	nag_dpprfs Refined solution with error bounds of real symmetric positive definite system of linear equations, multiple right-hand sides, packed storage
f07gjc	7	nag_dpptri Inverse of real symmetric positive definite matrix, matrix already factorized by nag_dpptrf (f07gdc), packed storage
f07gnc	23	nag_zppsv Computes the solution to a complex Hermitian positive definite system of linear equations, packed storage
f07gpc	23	nag_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
f07grc	7	nag_zpptrf Cholesky factorization of complex Hermitian positive definite matrix, packed storage
f07gsc	7	nag_zpptrs Solution of complex Hermitian positive definite system of linear equations, multiple right-hand sides, matrix already factorized by nag_zpptrf (f07grc), packed storage
f07gtc	23	nag_zppequ Computes row and column scalings intended to equilibrate a complex Hermitian positive definite matrix and reduce its condition number, packed storage
f07guc	7	nag_zppcon Estimate condition number of complex Hermitian positive definite matrix, matrix already factorized by nag_zpptrf (f07grc), packed storage
f07gvc	7	nag_zpprfs Refined solution with error bounds of complex Hermitian positive definite system of linear equations, multiple right-hand sides, packed storage
f07gwc	7	nag_zpptri Inverse of complex Hermitian positive definite matrix, matrix already factorized by nag_zpptrf (f07grc), packed storage
f07hac	23	nag_dpbsv Computes the solution to a real symmetric positive definite banded system of linear equations

f07hbc	23	nag_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
f07hdc	7	nag_dpbtrf Cholesky factorization of real symmetric positive definite band matrix
f07hec	7	nag_dpbrs Solution of real symmetric positive definite band system of linear equations, multiple right-hand sides, matrix already factorized by nag_dpbtrf (f07hdc)
f07hfc	23	nag_dpbequ Computes row and column scalings intended to equilibrate a real symmetric positive definite banded matrix and reduce its condition number
f07hgc	7	nag_dpbcon Estimate condition number of real symmetric positive definite band matrix, matrix already factorized by nag_dpbtrf (f07hdc)
f07hhc	7	nag_dpbrfs Refined solution with error bounds of real symmetric positive definite band system of linear equations, multiple right-hand sides
f07hnc	23	nag_zpbsv Computes the solution to a complex Hermitian positive definite banded system of linear equations
f07hpc	23	nag_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
f07hrc	7	nag_zpbtrf Cholesky factorization of complex Hermitian positive definite band matrix
f07hsc	7	nag_zpbtrs Solution of complex Hermitian positive definite band system of linear equations, multiple right-hand sides, matrix already factorized by nag_zpbtrf (f07hrc)
f07htc	23	nag_zpbequ Computes row and column scalings intended to equilibrate a complex Hermitian positive definite banded matrix and reduce its condition number
f07huc	7	nag_zpbcon Estimate condition number of complex Hermitian positive definite band matrix, matrix already factorized by nag_zpbtrf (f07hrc)
f07hvc	7	nag_zpbrfs Refined solution with error bounds of complex Hermitian positive definite band system of linear equations, multiple right-hand sides
f07jac	23	nag_dptsv Computes the solution to a real symmetric positive definite tridiagonal system of linear equations
f07jbc	23	nag_dptsvx Uses the $LDL^T$ factorization to compute the solution, error-bound and condition estimate for a real symmetric positive definite tridiagonal system of linear equations
f07jdc	23	nag_dpstrf Computes the $LDL^T$ factorization of a real symmetric positive definite tridiagonal matrix
f07jec	23	nag_dpstrs Solves a real symmetric positive definite tridiagonal system using the $LDL^T$ factorization computed by nag_dpstrf (f07jdc)
f07jgc	23	nag_dptcon Computes the reciprocal of the condition number of a real symmetric positive definite tridiagonal system using the $LDL^T$ factorization computed by nag_dpstrf (f07jdc)

f07jhc	23	nag_dptrfs Refined solution with error bounds of real symmetric positive definite tridiagonal system of linear equations, multiple right-hand sides
f07jnc	23	nag_zptsv Computes the solution to a complex Hermitian positive definite tridiagonal system of linear equations
f07jpc	23	nag_zptsvx Uses the $LDL^T$ factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive definite tridiagonal system of linear equations
f07jrc	23	nag_zpttrf Computes the $LDL^H$ factorization of a complex Hermitian positive definite tridiagonal matrix
f07jsc	23	nag_zpttrs Solves a complex Hermitian positive definite tridiagonal system using the $LDL^H$ factorization computed by nag_zpttrf (f07jrc)
f07juc	23	nag_zptcon Computes the reciprocal of the condition number of a complex Hermitian positive definite tridiagonal system using the $LDL^H$ factorization computed by nag_zpttrf (f07jrc)
f07jvc	23	nag_zptrfs Refined solution with error bounds of complex Hermitian positive definite tridiagonal system of linear equations, multiple right-hand sides
f07kdc	25	nag_dpstrf Cholesky factorization, with complete pivoting, of a real, symmetric, positive semidefinite matrix
f07krc	25	nag_zpstrf Cholesky factorization of complex Hermitian positive semidefinite matrix
f07mac	23	nag_dsysv Computes the solution to a real symmetric system of linear equations
f07mbc	23	nag_dsysvx Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations
f07mdc	7	nag_dsytrf Bunch–Kaufman factorization of real symmetric indefinite matrix
f07mec	7	nag_dsytrs Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by nag_dsytrf (f07mdc)
f07mgc	7	nag_dsycon Estimate condition number of real symmetric indefinite matrix, matrix already factorized by nag_dsytrf (f07mdc)
f07mhc	7	nag_dsytrfs Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides
f07mjc	7	nag_dsytri Inverse of real symmetric indefinite matrix, matrix already factorized by nag_dsytrf (f07mdc)
f07mnc	23	nag_zhesv Computes the solution to a complex Hermitian system of linear equations
f07mpc	23	nag_zhesvx Uses the diagonal pivoting factorization to compute the solution to a complex Hermitian system of linear equations
f07mrc	7	nag_zhetrf Bunch–Kaufman factorization of complex Hermitian indefinite matrix
f07msc	7	nag_zhetrs Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by nag_zhetrf (f07mrc)

f07muc	7	nag_zhecon Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by nag_zhetrf (f07mrc)
f07mvc	7	nag_zherfs Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides
f07mwc	7	nag_zhetri Inverse of complex Hermitian indefinite matrix, matrix already factorized by nag_zhetrf (f07mrc)
f07nnc	23	nag_zsysv Computes the solution to a complex symmetric system of linear equations
f07npc	23	nag_zsysvx Uses the diagonal pivoting factorization to compute the solution to a complex symmetric system of linear equations
f07nrc	7	nag_zsytrf Bunch–Kaufman factorization of complex symmetric matrix
f07nsc	7	nag_zsytrs Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by nag_zsytrf (f07nrc)
f07nuc	7	nag_zsycon Estimate condition number of complex symmetric matrix, matrix already factorized by nag_zsytrf (f07nrc)
f07nvc	7	nag_zsyrrfs Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides
f07nwc	7	nag_zsytri Inverse of complex symmetric matrix, matrix already factorized by nag_zsytrf (f07nrc)
f07pac	23	nag_dspsv Computes the solution to a real symmetric system of linear equations, packed storage
f07pbc	23	nag_dspsvx Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations, packed storage. Error bounds and a condition estimate are also computed.
f07pdc	7	nag_dsptrf Bunch–Kaufman factorization of real symmetric indefinite matrix, packed storage
f07pec	7	nag_dsptrs Solution of real symmetric indefinite system of linear equations, multiple right-hand sides, matrix already factorized by nag_dsptrf (f07pdc), packed storage
f07pgc	7	nag_dspcon Estimate condition number of real symmetric indefinite matrix, matrix already factorized by nag_dsptrf (f07pdc), packed storage
f07phc	7	nag_dsprfs Refined solution with error bounds of real symmetric indefinite system of linear equations, multiple right-hand sides, packed storage
f07pjc	7	nag_dsptri Inverse of real symmetric indefinite matrix, matrix already factorized by nag_dsptrf (f07pdc), packed storage
f07pnc	23	nag_zhpsv Computes the solution to a complex Hermitian system of linear equations, packed storage
f07ppc	23	nag_zhpsvx Uses the diagonal pivoting factorization to compute the solution to a complex, Hermitian, system of linear equations, error bounds and condition estimates. Packed storage

f07prc	7	nag_zhptrf Bunch–Kaufman factorization of complex Hermitian indefinite matrix, packed storage
f07psc	7	nag_zhptrs Solution of complex Hermitian indefinite system of linear equations, multiple right-hand sides, matrix already factorized by nag_zhptrf (f07prc), packed storage
f07puc	7	nag_zhpcon Estimate condition number of complex Hermitian indefinite matrix, matrix already factorized by nag_zhptrf (f07prc), packed storage
f07pvc	7	nag_zhprfs Refined solution with error bounds of complex Hermitian indefinite system of linear equations, multiple right-hand sides, packed storage
f07pwc	7	nag_zhptri Inverse of complex Hermitian indefinite matrix, matrix already factorized by nag_zhptrf (f07prc), packed storage
f07qnc	23	nag_zspsv Computes the solution to a complex symmetric system of linear equations, packed storage
f07qpc	23	nag_zspsvx Uses the diagonal pivoting factorization to compute the solution to a complex, symmetric, system of linear equations, error bounds and condition estimates. Packed storage
f07qrc	7	nag_zsprtf Bunch–Kaufman factorization of complex symmetric matrix, packed storage
f07qsc	7	nag_zsprts Solution of complex symmetric system of linear equations, multiple right-hand sides, matrix already factorized by nag_zsprtf (f07qrc), packed storage
f07quc	7	nag_zspcon Estimate condition number of complex symmetric matrix, matrix already factorized by nag_zsprtf (f07qrc), packed storage
f07qvc	7	nag_zsprfs Refined solution with error bounds of complex symmetric system of linear equations, multiple right-hand sides, packed storage
f07qwc	7	nag_zsprtri Inverse of complex symmetric matrix, matrix already factorized by nag_zsprtf (f07qrc), packed storage
f07tec	7	nag_dtrtrs Solution of real triangular system of linear equations, multiple right-hand sides
f07tgc	7	nag_dtrcon Estimate condition number of real triangular matrix
f07thc	7	nag_dtrrfs Error bounds for solution of real triangular system of linear equations, multiple right-hand sides
f07tjc	7	nag_dtrtri Inverse of real triangular matrix
f07tsc	7	nag_ztrtrs Solution of complex triangular system of linear equations, multiple right-hand sides
f07tuc	7	nag_ztrcon Estimate condition number of complex triangular matrix
f07tvc	7	nag_ztrrfs Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides
f07twc	7	nag_ztrtri Inverse of complex triangular matrix



f07uec	7	nag_dtptrs Solution of real triangular system of linear equations, multiple right-hand sides, packed storage
f07ugc	7	nag_dtpcon Estimate condition number of real triangular matrix, packed storage
f07uhc	7	nag_dtpfrs Error bounds for solution of real triangular system of linear equations, multiple right-hand sides, packed storage
f07ujc	7	nag_dtptri Inverse of real triangular matrix, packed storage
f07usc	7	nag_ztptrs Solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
f07uuc	7	nag_ztpcon Estimate condition number of complex triangular matrix, packed storage
f07uvc	7	nag_ztpfrs Error bounds for solution of complex triangular system of linear equations, multiple right-hand sides, packed storage
f07uwc	7	nag_ztptri Inverse of complex triangular matrix, packed storage
f07vec	7	nag_dtbtrs Solution of real band triangular system of linear equations, multiple right-hand sides
f07vgc	7	nag_dtbcon Estimate condition number of real band triangular matrix
f07vhc	7	nag_dtbfrs Error bounds for solution of real band triangular system of linear equations, multiple right-hand sides
f07vsc	7	nag_ztbtrs Solution of complex band triangular system of linear equations, multiple right-hand sides
f07vuc	7	nag_ztbcon Estimate condition number of complex band triangular matrix
f07vvc	7	nag_ztbfrs Error bounds for solution of complex band triangular system of linear equations, multiple right-hand sides
f07wdc	25	nag_dpfrf Cholesky factorization of real symmetric positive definite matrix, Rectangular Full Packed format
f07wec	25	nag_dpfrs Solution of real symmetric positive definite system of linear equations, multiple right-hand sides, coefficient matrix already factorized by nag_dpfrf (f07wdc), Rectangular Full Packed format
f07wjc	25	nag_dpfri Inverse of real symmetric positive definite matrix, matrix already factorized by nag_dpfrf (f07wdc), Rectangular Full Packed format
f07wkc	25	nag_dtftri Inverse of real triangular matrix, Rectangular Full Packed format
f07wrc	25	nag_zpfrf Cholesky factorization of complex Hermitian positive definite matrix, Rectangular Full Packed format
f07wsc	25	nag_zpfrs Solution of complex Hermitian positive definite system of linear equations, multiple right-hand sides, coefficient matrix already factorized by nag_zpfrf (f07wrc), Rectangular Full Packed format

f07wwc	25	nag_zpftri Inverse of complex Hermitian positive definite matrix, matrix already factorized by nag_zpftrf (f07wrc), Rectangular Full Packed format
f07wxc	25	nag_ztftri Inverse of complex triangular matrix, Rectangular Full Packed format

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