Cumulative Index for the Collected Algorithms from the ACM

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The SHAR Classification Index

A1	Real Arithmetic, Number Theory
A2	Complex Arithmetic
B1	Trig and Inverse Trig Functions
B2	Hyperbolic Functions
B3	Exponential and Logarithmic Functions
B4	Roots and Powers
C1	Operations on Polynomials and Power Series
C2	Zeros of Polynomials
C5	Zeros of one or more Nonlinear Equations
C6	Summation of Series, Convergence Acceleration
D1	Quadrature
D2	Ordinary Differential Equations
D3	Partial Differential Equations
D4	Differentiation
D5	Integral Equations
E1	Interpolation
E2	Curve and Surface Fitting
E3	Smoothing
E4	Minimizing or Maximizing a Function
F1	Matrix Operations, including Inversion
F2	Eigenvalues and Eigenvectors of a Matrix
F3	Determinants
F4	Simultaneous Linear Equations
F5	Orthogonalization
G1	Simple Calculations on Statistical Data
G2	Correlation and Regression Analysis
G5	Random Number Generators
G6	Permutations and Combinations
G7	Subset Generators
H	Operations Research, Graph Structure
I5	Input – Composite
J6	Plotting
K2	Relocation
L2	Compiling
M1	Sorting
M2	Data Conversion and Scaling
O2	Simulation of Computing Structure
R2	Symbol Manipulation
S	Approximation of Special Functions
Y1	Physics Applications
Z	All Others

Special Funcions Classification Index

Key to the Index

In the main index references have the following form

Journal Volume : Page Number

where Journal may be

C	=	Communications of the ACM
T	=	Transactions on Mathematical Software (TOMS)
TPL	=	Transactions on Programming Languages and Systems (TOPLAS)

The first reference, in bold, refers to the original publication of the algorithm; all other references are to remarks.

Number	Algorithm Title	References

A1 : Real Arithmetic, Number Theory

7	Euclidian Algorithm	**C3:240**
35	SIEVE	**C4:151** C5:209 C5:438 C10:570
61	Procedures For Range Arithmetic	**C4:319**
68	Augmentation	**C4:339** C4:498
72	Composition Generator	**C4:498** C5:439
93	General Order Arithmetic	**C5:344** C5:514
95	Generation of Partitions in Part-Count Form	**C5:344**
99	Evaluation of Jacobi Symbol	**C5:345** C5:557
114	Generation of Partitions with Constraints	**C5:434**
139	Solutions of the Diophantine Equation	**C5:556** C8:170
223	Prime Twins	**C7:243**
237	Greatest Common Divisor	**C7:481** C7:702
262	Number of Restricted Partitions of N	**C8:493**
263	Partition Generator	**C8:493**
263A	Gomory 1	**C8:601** C13:326
307	Symmetric Group Characters	**C10:451** C11:14
310	Prime Number Generator 1	**C10:569** C10:570 C13:192
311	Prime Number Generator 2	**C10:570** C10:570
313	Multi-Dimensional Partition Generator	**C10:666**
356	A Prime Number Generator Using the Treesort Principle	**C12:563**
357	An Efficient Prime Number Generator	**C12:563** C16:489
371	Partitions in Natural Order	**C13:52**
372	An Algorithm to Produce Complex Primes CSIEVE	**C13:52** C13:695
373	Number of Doubly Restricted Partitions	**C13:120**
374	Restricted Partition Generator	**C13:120**
386	Greatest Common Divisor of n Integers and Multipliers	**C13:447** C16:257
401	An Improved Algorithm to Produce Complex Primes	**C13:693** C13:695
403	Circular Integer Partitioning	**C14:48**
448	Number of Multiply-Restricted Partitions	**C16:379**
469	Arithmetic Over a Finite Field	**C16:699**
524	MP: A FORTRAN Multiple-Precision Arithmetic Package	**T4:71** T5:518
567	Extended Range Arithmetic and Normalized Legendre Polynomials	**T7:141**
665	MACHAR: A Subroutine to Dynamically Determine Machine Parameters	**T14:303**
693	A FORTRAN Package for Floating-point Multiple-precision Arithmetic	**T17:273**
719	Multiprecision Translation and Execution of FORTRAN Programs	**T19:288**
722	Functions to Support the IEEE Standard for Binary Floating-Point Arithmetic	**T19:443**

Number	Algorithm Title	References
737	INTLIB: A Portable FORTRAN 77 Interval Standard-Function Library	**T20:447**
763	INTERVAL_ARITHMETIC: A Fortran 90 Module for an Interval Data Type	**T22:385**

A2 : Complex Arithmetic

116	Complex Division	**C5:435**
186	Complex Arithmetic	**C6:386**
312	Absolute Value and Square Root of a Complex Number	**C10:665**
786	Multiple Precision Complex Arithmetic and Functions	**T24:359**

B1 : Trig and Inverse Trig Functions

206	Arccossin	**C6:519** C8:104
229	Elementary Functions by Continued Fractions	**C7:296** C12:692
241	Arctangent	**C7:546**

B3 : Exponential and Logarithmic Functions

46	Exponential of a Complex Number	**C4:178** C5:347
48	Logarithm of a Complex Number	**C4:179** C5:347 C5:391 C7:485
243	Logarithm of a Complex Number	**C7:660** C8:279

B4 : Roots and Powers

53	$N\mathrm{th}$ Roots of a Complex Number	**C4:180** C4:322
106	Complex Number to a Real Power	**C5:388** C5:557
190	Complex Power	**C6:388**
650	Efficient Square Root Implementation on the 68000	**T13:138**

C1 : Operations on Polynomials and Power Series

29	Polynomial Transformer	**C3:604**
131	Coefficient Determination	**C5:551**
134	Exponential of Series	**C5:553** C6:390
158	Exponentiation of Series	**C6:104** C6:390 C6:522
193	Reversion of Series	**C6:388** C6:745
273	SERREV	**C9:11**
305	Symmetric Polynomials	**C10:450** C11:272
337	Calculation of a Polynomial and Its Derivative Values by Horner Scheme	**C11:633** C12:39
446	Ten Subroutines for the Manipulation of Chebyshev Series	**C16:254** C18:276
604	A FORTRAN Program for the Calculation of an Extremal Polynomial	**T9:381**

Number	Algorithm Title	References
766	Experiments with a Weakly Stable Algorithm for Computing Padé-Hermite and Simultaneous Padé Approximants	**T23:91**

C2 : Zeros of Polynomials

Number	Algorithm Title	References
3	Solution of Polynomial Equation by Bairstow-Hitchcock Method	**C3:74** C3:354 C4:105 C4:153 C4:181
30	Numerical Solution of the Polynomial Equation	**C3:643** C4:238 C5:50 C10:293 T11:183
59	Zeros of a Real Polynomial by Resultant Procedure	**C4:236**
75	Factors	**C5:48** C5:392 C5:439
78	Rational Roots of Polynomials with Integer Coefficients	**C5:97** C5:168 C5:440
105	Newton Maehly	**C5:387** C6:389
174	A Posteriori Bounds on a Zero of a Polynomial	**C6:311**
256	Modified Graeffe Method	**C8:379** C9:687
283	Simultaneous Displacement of Polynomial Roots if Real and Simple	**C9:273**
326	Roots of Low-Order Polynomial Equations	**C11:269**
340	Roots of Polynomials by a Root-Squaring and Resultant Routine	**C11:779** C12:281
419	Zeros of a Complex Polynomial	**C15:97** C17:157
429	Localization of the Roots of a Polynomial	**C15:776** C16:490 C16:579
493	Zeros of a Real Polynomial	**T1:178**
795	PHCpack: A General-Purpose Solver for Polynomial Systems by Homotopy Continuation	**T25:251**

C5 : Zeros of one or more Nonlinear Equations

Number	Algorithm Title	References
2	Rootfinder	**C3:74** C3:354 C3:475 C4:153
4	Bisection Routine	**C3:174** C4:153
15	Rootfinder II	**C3:475** C3:475 C3:602 C4:153
25	Real Zeros of An Arbitrary Function	**C3:602** C4:153 C4:154
26	Rootfinder III	**C3:603** C4:153
196	Muller's Method for Finding Roots of an Arbitrary Function	**C6:442** C11:12
314	Finding a Solution of N Functional Equations in N Unknowns	**C10:726** C12:38
316	Solution of Simultaneous Nonlinear Equations	**C10:728** C14:493
365	Complex Root Finding	**C12:686**
378	Discretized Newton-like Method for Solving a System of Simultaneous Nonlinear Equations	**C13:259**
413	ENTCAF and ENTCRE: Evaluation of Normalized Taylor Coefficients of an Analytic Function	**C14:669**

Number	Algorithm Title	References
443	Solution of the Transcendental Equation $we^w = x$	**C16:123** C17:225
502	Dependence of Solution of Nonlinear Systems on a Parameter	**T2:98**
554	BRENTM: A FORTRAN Subroutine for the Numerical Solution of Systems of Nonlinear Equations	**T6:240**
555	Chow-Yorke Algorithm for Fixed Points or Zeros of C^2 Maps	**T6:252**
566	FORTRAN Subroutines for Testing Unconstrained Optimization Software	**T7:136** T20:282
631	Finding a Bracketed Zero by Larkin's Method of Rational Interpolation	**T11:120** T12:72
652	HOMPACK: A Suite of Codes for Globally Convergent Homotopy Algorithms	**T13:281**
666	CHABIS: A Mathematical Software Package for Locating and Evaluating Roots of Systems of Nonlinear Equations	**T14:330**
681	INTBIS, a Portable Interval Newton/Bisection Package	**T16:152**
743	WAPR: A FORTRAN Routine for Calculating Real Values of the W-Function	**T21:172**
748	Enclosing Zeros of Continuous Functions	**T21:327**
777	HOMPACK90: A Suite of Fortran 90 Codes for Globally Convergent Homotopy Algorithms	**T23:514**

C6 : Summation of Series, Convergence Acceleration

8	Euler Summation	**C3:318** C6:663
128	Summation of Fourier Series	**C5:513** C7:421
157	Fourier Series Approximation	**C6:103** C6:521 C6:618
215	Shanks	**C6:662** C7:297
255	Computation of Fourier Coefficients	**C8:279** C12:636
277	Computation of Chebyshev Series Coefficients	**C9:86**
320	Harmonic Analysis for Symmetrically Distributed Data	**C11:114**
338	Algol Procedures For the Fast Fourier Transform	**C11:773**
339	An Algol Procedure for the Fast Fourier Transform with Arbitrary Factors	**C11:776** C12:187
345	An Algol Convolution Procedure Based on the Fast Fourier Transform	**C12:179** C12:566
393	Special Series Summation with Arbitrary Precision	**C13:570** C15:468
473	Computation of Legendre Series Coefficients	**C17:25**
545	An Optimized Mass Storage FFT	**T5:500**
602	HURRY: An Acceleration Algorithm for Scalar Sequences and Series	**T9:355**
749	Fast Discrete Cosine Transform	**T21:372**

D1 : Quadrature

1	Quad I	**C3:74**
32	Multint	**C4:106** C6:69 C11:826

Number	Algorithm Title	References
60	Romberg Integration	**C4:255** C5:168 C5:281 C7:420
84	Simpson's Integration	**C5:208** C5:392 C5:440 C5:557
98	Evaluation of Definite Complex Line Integrals	**C5:345**
103	Simpson's Rule Integrator	**C5:347**
125	Weightcoeff	**C5:510**
145	Adaptive Numerical Integration by Simpson's Rule	**C5:604** C6:167 C8:171
146	Multiple Integration	**C5:604** C7:296
182	Nonrecursive Adaptive Integration	**C6:315** C7:244
198	Adaptive Integration and Multiple Integration	**C6:443**
233	Simpson's Rule for Multiple Integration	**C7:348** C13:512
257	Havie Integrator	**C8:381** C9:795 C9:871
279	Chebyshev Quadrature	**C9:270** C9:434 C10:294 C10:666
280	Abscissas and Weights for Gregory Quadrature	**C9:271**
281	Abscissas and Weights for Romberg Quadrature	**C9:271** C10:188
303	An Adaptive Quadrature Procedure with Random Panel Sizes	**C10:373**
331	Gaussian Quadrature Formulas	**C11:432** C12:280 C13:512
351	Modified Romberg Quadrature	**C12:324** C13:263 C13:374 C13:449
353	Filon Quadrature	**C12:457** C13:263
379	Squank (Simpson Quadrature Used Adaptively-Noise Killed)	**C13:260** C15:1073
400	Modified Havie Integration	**C13:622** C17:324
417	Rapid Computation of Weights of Interpolatory Quadrature Rules	**C14:807**
418	Calculation of Fourier Integrals	**C15:47** C15:469 C17:324
424	Clenshaw-Curtis Quadrature	**C15:353** C16:490 T5:240
427	Fourier Cosine Integral	**C15:358**
436	Product Type Trapezoidal Integration	**C15:1070**
437	Product Type Simpson's Integration	**C15:1070**
438	Product Type Two-point Gauss-Legendre-Simpson's Integration	**C15:1071**
439	Product Type Three-point Gauss-Legendre-Simpson's Integration	**C15:1072**
440	A Multidimensional Monte Carlo Quadrature with Adaptive Stratified Sampling	**C16:49**
453	Gaussian Quadrature Formulas for Bromwich's Integral	**C16:486**
468	Algorithm for Automatic Numerical Integration Over a Finite Interval	**C16:694**

Number	Algorithm Title	References
584	CUBTRI – Automatic Cubature Over a Triangle	**T8:210** T12:71
612	TRIEX: Integration Over a TRIangle Using Nonlinear EXtrapolation	**T10:17**
614	A FORTRAN Subroutine for Integration in H_p Spaces	**T10:140**
639	To Integrate Some Infinite Oscillating Tails	**T12:24**
647	Implementation and Relative Efficiency of Quasirandom Sequence Generators	**T12:362**
649	A Package for Computing Trigonometric Fourier Coefficients Based on Lyness's Algorithm	**T13:97**
655	IQPACK: FORTRAN Subroutines for the Weights of Interpolatory Quadratures	**T13:399**
672	Generation of Interpolatory Quadrature Rules of the Highest Degree of Precision with Preassigned Nodes for General Weight Functions	**T15:137**
691	Improving QUADPACK Automatic Integration Routines	**T17:218**
698	DCUHRE: An Adaptive Multidimensional Integration Routine for a Vector of Integrals	**T17:452**
699	A New Representation of Patterson's Quadrature Formulae	**T17:457**
706	DCUTRI: An Algorithm for Adaptive Cubature Over a Collection of Triangles	**T18:329** T24:334
720	An Algorithm for Adaptive Cubature Over a Collection of 3-Dimensional Simplices	**T19:320**
726	ORTHPOL – A Package of Routines for Generating Orthogonal Polynomials and Gauss-Type Quadrature Rules	**T20:21** T24:355
764	Cubpack++: A C++ Package for Automatic Two-Dimensional Cubature	**T23:1**
793	GQRAT — Gauss Quadrature for Rational Functions	**T25:213**

D2 : Ordinary Differential Equations

9	Runge-Kutta Integration	**C3:318** C9:273
194	ZERSOL	**C6:441**
218	Kutta Merson	**C6:737** C7:585 C9:273
407	DIFSUB for Solution of Ordinary Differential Equations	**C14:185** C16:448
461	Cubic Spline Solutions to a Class of Functional Differential Equations	**C16:635**
497	Automatic Integration of Functional Differential Equations	**T1:369**
504	GERK: Global Error Estimation for Ordinary Differential Equations	**T2:200**
534	STINT: STiff (differential equations) INTegrator	**T4:399**
569	COLSYS: Collocation Software for Boundary Value ODE's	**T7:223** T12:283
596	A Program for a Locally Parametrized Continuation Process	**T9:236**
648	NSDTST and STDTST: Routines for Assessing the Performance of Initial Value Solvers	**T13:28**

Number	Algorithm Title	References
658	ODESSA: An Ordinary Differential Equation Solver with Explicit Simultaneous Sensitivity Analysis	**T14:61**
669	BRK45: A FORTRAN Subroutine for Solving First-Order Systems of Nonstiff Initial Value Problems for Ordinary Differential Equations	**T15:29** T17:424
670	A Runge-Kutta-Nyström Code	**T15:31**
687	A Decision Tree for the Numerical Solution of Initial Value Ordinary Differential Equations	**T17:1**
700	A FORTRAN Software Package for Sturm-Liouville Problems	**T17:500** T17:481
703	MEBDF: A FORTRAN Subroutine for Solving First-Order Systems of Stiff Initial Value Problems for Ordinary Differential Equations	**T18:156**
721	MTIEU1 and MTIEU2: Two Subroutines to Compute Eigenvalues and Solutions to Mathieu's Differential Equation for Noninteger and Integer Order	**T19:391**
733	TOMP: FORTRAN Modules for Optimal Control Calculations	**T20:262**
756	A Matlab Toolbox for Schwarz-Christoffel Mapping	**T22:168**
771	rksuite_90: Fortran 90 Software for Ordinary Differential Equation Initial-Value Problems	**T23:402**
775	The Code SLEUTH for Solving Fourth-Order Sturm Liouville Problems	**T23:453**
785	A Software Package for Computing Schwarz-Christoffel Conformal Transformation for Doubly Connected Polygonal Regions	**T24:317**
789	SLTSTPAK: A Test Package for Sturm-Liouville Solvers	**T25:58**

D3 : Partial Differential Equations

Number	Algorithm Title	References
392	Systems of Hyperbolic P.D.E.	**C13:567** C15:1074
460	Calculation of Optimum Parameters for Alternating Direction Implicit Procedures	**C16:633**
494	PDEONE Solution of Systems of Partial Differential Equations	**T1:261**
527	A FORTRAN Implementation of the Generalized Marching Algorithm	**T4:165**
540	PDECOL: General Collocation Software for Partial Differential Equations	**T5:326** T18:343
541	Efficient FORTRAN Subprograms for the Solution of Separable Elliptic Partial Differential Equations	**T5:352** T5:365
543	FFT9: Fast Solution of Helmholtz-Type Partial Differential Equations	**T5:490**
553	M3RK: An Explicit Time Integrator for Semidiscrete Parabolic Equations	**T6:236**
565	PDETWO/PSETM/GEARB: Solution for Systems of Two-Dimensional Nonlinear Partial Differential Equations	**T7:126**
572	Solution of the Helmholtz Equation for the Dirichlet Problem on General Bounded Three Dimensional Regions	**T7:239**

Number	Algorithm Title	References
593	A Package for the Helmholtz Equation in Nonrectangular Planar Regions	**T9:117**
621	Software with Low Storage Requirements for Two-Dimensional Nonlinear Parabolic Differential Equations	**T10:378**
637	GENCOL: Collocation on General Domains with Bicubic Hermite Polynomials	**T11:413**
638	INTCOL and HERMCOL: Collocation on Rectangular Domains with Bicubic Hermite Polynomials	**T11:416**
651	Algorithm HFFT: High-Order Fast-Direct Solution of Helmholtz Equation in Three Dimensions	**T13:235**
685	A Program for Solving Separable Elliptic Equations	**T16:325**
688	EPDCOL: A More Efficient PDECOL Code	**T17:153**
690	Chebyshev Polynomial Software for Elliptic-Parabolic Systems of PDEs	**T17:178**
731	A Moving-Grid Interface for Systems of One-Dimensional Time-Dependent Partial Differential Equations	**T20:194**
732	Solvers for Self-Adjoint Elliptic Problems in Irregular Two-Dimensional Domains	**T20:247**
758	VLUGR2: A Vectorizable Adaptive-Grid Solver for PDEs in 2D	**T22:302**
759	VLUGR3: A Vectorizable Adaptive-Grid Solver for PDEs in 3D — Part II. Code Description	**T22:329**

D4 : Differentiation

79	Difference Expression Coefficients	**C5:97** C6:104
579	CPSC: Complex Power Series Coefficients	**T7:542**

D5 : Integral Equations

368	Numerical Inversion of Laplace Transforms	**C13:47** C13:624
486	Numerical Inversion of Laplace Transform	**C17:587** T2:395 T3:111 T10:354
503	An Automatic Program for Fredholm Integral Equations for the Second Kind	**T2:196**
619	Automatic Numerical Inversion of the Laplace Transform	**T10:348**
627	A FORTRAN Subroutine for Solving Volterra Integral Equations	**T11:58**
629	An Integral Equation Program for Laplace's Equation in Three Dimensions	**T11:85**
662	A FORTRAN Software Package for the Numerical Inversion of the Laplace Transform Based on Weeks' Method	**T14:171** T16:405
682	Talbot's Method for the Laplace Inversion Problem	**T16:158**
689	Discretized Collocation and Iterated Collocation for Nonlinear Volterra Integral Equations of the Second Kind	**T17:167**

Number	Algorithm Title	References
788	Automatic Boundary Integral Equation Programs for the Planar Laplace Equation	**T24:395**
796	A Fortran Software Package for the Numerical Inversion of the Laplace Transform Based on a Fourier Series Method	**T25:306**

E1 : Interpolation

Number	Algorithm Title	References
18	Rational Interpolation by Continued Fractions	**C3:508** C5:437
70	Interpolation by Aitken	**C4:497** C5:392
77	Interpolation Differentiation and Integration	**C5:96** C5:348 C6:446 C6:663
167	Calculation of Confluent Divided Differences	**C6:164** C6:523
168	Newton Interpolation with Backward Divided Differences	**C6:165** C6:523
169	Newton Interpolation with Forward Divided Differences	**C6:165** C6:523
187	Differences and Derivatives	**C6:387**
210	Lagrangian Interpolation	**C6:616** C6:619
211	Hermite Interpolation	**C6:617**
264A	Interpolation in a Table	**C8:602**
416	Rapid Computation of Coefficients of Interpolation Formulas	**C14:806**
472	Procedures for Natural Spline Interpolation	**C16:763**
480	Procedures for Computing Smoothing and Interpolating Natural Splines	**C17:463**
507	Procedures for Quintic Natural Spline Interpolation	**T2:281** T8:334
526	Bivariate Interpolation and Smooth Surface Fitting for Irregularly Distributed Data Points	**T4:160** T5:242 T11:186
574	Shape-Preserving Osculatory Quadratic Splines	**T7:384**
585	A Subroutine for the General Interpolation and Extrapolation Problems	**T8:290**
623	Interpolation on the Surface of a Sphere	**T10:437**
624	Triangulation and Interpolation at Arbitrarily Distributed Points in the Plane	**T10:440**
770	BVSPIS—A Package for Computing Boundary-Valued Shape-Preserving Interpolating Splines	**T23:252**
790	CSHEP2D: Cubic Shepard Method for Bivariate Interpolation of Scattered Data	**T25:70**
791	TSHEP2D: Cosine Series Shepard Method for Bivariate Interpolation of Scattered Data	**T25:74**
792	Accuracy Tests of ACM Algorithms for Interpolation of Scattered Data in the Plane	**T25:78**
798	High-Dimensional Interpolation Using the Modified Shepard Method	**T25:353**

E2 : Curve and Surface Fitting

Number	Algorithm Title	References
28	Least Squares Fit by Orthogonal Polynomials	**C3:604** C4:544 C10:293

Number	Algorithm Title	References
37	Telescope 1	**C4:151** C5:438 C6:445
38	Telescope 2	**C4:151** C6:445
74	Curve Fitting with Constraints	**C5:47** C6:316
91	Chebyshev Curve-Fit	**C5:281** C6:167 C7:296 C10:803
164	Orthogonal Polynomial Least Squares Surface Fit	**C6:162** C6:450
176	Least Squares Surface Fit	**C6:313** C15:1073
177	Least Squares Solution with Constraints	**C6:313** C6:390
275	Exponential Curve Fit	**C9:85**
276	Constrained Exponential Curve Fit	**C9:85**
295	Exponential Curve Fit	**C10:87**
296	Generalized Least Squares Fit by Orthogonal Polynomials	**C10:87** C10:377 C12:636
318	Chebyschev Curve-Fit (Revised)	**C10:801**
375	Fitting Data to One Exponential	**C13:120**
376	Least Squares Fit by $f(x) = A\cos(Bx + C)$	**C13:121**
409	Discrete Chebychev Curve Fit	**C14:355**
414	Chebyshev Approximation of Continuous Functions by a Chebyshev System of Functions	**C14:737**
433	Interpolation and Smooth Curve Fitting Based on Local Procedures	**C15:914** T2:208
458	Discrete Linear L_1 Approximation by Interval Linear Programming	**C16:629**
474	Bivariate Interpolation and Smooth Surface Fitting Based on Local Procedures	**C17:26** T5:241
476	Six Subprograms for Curve Fitting Using Splines Under Tension	**C17:220**
485	Computation of g-Splines via a Factorization Method	**C17:526**
501	FORTRAN Translation of Algorithm 409 Discrete Chebyshev Curve Fit	**T2:95** T4:95
510	Piecewise Linear Approximations to Tabulated Data	**T2:388**
514	A New Method of Cubic Curve Fitting Using Local Data	**T3:175**
525	ADAPT: Adaptive Smooth Curve Fitting	**T4:82**
592	A FORTRAN Subroutine for Computing the Optimal Estimate of $f(x)$	**T9:98**
600	Translation of Algorithm 507. Procedures for Quintic Natural Spline Interpolation	**T9:258**
634	CONSTR and EVAL: Routines for Fitting Multinomials in a Least-Squares Sense	**T11:218**
660	QSHEP2D: Quadratic Shepard Method for Bivariate Interpolation of Scattered Data	**T14:149**
661	QSHEP3D: Quadratic Shepard Method for Trivariate Interpolation of Scattered Data	**T14:151**
677	C^1 Surface Interpolation	**T15:365**

Number	Algorithm Title	References
684	C^1- and C^2- Interpolation on Triangles with Quintic and Nonic Bivariate Polynomials	**T16:253**
697	Univariate Interpolation that Has the Accuracy of a Third-Degree Polynomial	**T17:367**
716	TSPACK: Tension Spline Curve-Fitting Package	**T19:81** T25:95
751	TRIPACK: Constrained Two-Dimensional Delauney Triangulation Package	**T22:1** T25:97
752	SRFPACK: Software for Scattered Data Fitting with a Constrained Surface under Tension	**T22:9** T25:99
760	Rectangular-Grid-Data Surface Fitting that Has the Accuracy of a Bicubic Polynomial	**T22:357**
761	Scattered-Data Surface Fitting that Has the Accuracy of a Cubic Polynomial	**T22:362** T24:383
772	STRIPACK: Delaunay Triangulation and Voronoi Diagram on the Surface of a Sphere	**T23:416**
773	SSRFPACK: Interpolation of Scattered Data on the Surface of a Sphere with a Surface under Tension	**T23:435**
783	Pcp2Nurb – Smooth Free-Form Surfacing with Linearly Trimmed Bicubic B-Splines	**T24:261**

E3 : Smoothing

Number	Algorithm Title	References
188	Smoothing 1.	**C6:387**
189	Smoothing 2.	**C6:387**
216	Smooth	**C6:663**
547	FORTRAN Routines For Discrete Cubic Spline Interpolation and Smoothing	**T6:92**

E4 : Minimizing or Maximizing a Function

Number	Algorithm Title	References
129	Minifun	**C5:550** C6:521
178	Direct Search	**C6:313** C9:684 C11:498 C12:637 C12:638
203	STEEP1	**C6:517** C7:585 C8:171
204	STEEP2	**C6:519**
205	ATIVE	**C6:519** C8:171
251	Function Minimisation	**C8:169** C9:686 C12:512 C14:358
315	The Damped Taylor's Series Method for Minimizing a Sum of Squares and for Solving Systems of Nonlinear Equations	**C10:726** C12:513
387	Function Minimization and Linear Search	**C13:509**
450	Rosenbrock Function Minimization	**C16:482** C17:470 C17:590 T2:300

Number	Algorithm Title	References
454	The Complex Method for Constrained Optimization	**C16:487** C17:471
500	Minimization of Unconstrained Multivariate Functions	**T2:87** T3:112 T6:618
559	The Stationary Point of a Quadratic Function Subject to Linear Constraints	**T6:432**
573	NL2SOL – An Adaptive Nonlinear Least-Squares Algorithm	**T7:369** T9:139
611	Subroutines for Unconstrained Minimization Using a Model/Trust-Region Approach	**T9:503**
617	DAFNE: A Differential-Equations Algorithm for Nonlinear Equations	**T10:317**
630	BBVSCG – A Variable-Storage Algorithm for Function Minimization	**T11:103** T15:262
667	SIGMA: A Stochastic-Integration Global Minimization Algorithm	**T14:366**
702	TNPACK – A Truncated Newton Minimization Package for Large-Scale Problems: I. Algorithm and Usage	**T18:46** T25:108
711	BTN: Software for Parallel Unconstrained Optimization	**T18:414**
728	FORTRAN Subroutines for Generating Quadratic Bilevel Programming Test Problems	**T20:120**
734	A Fortran 90 Code for Unconstrained Nonlinear Minimization	**T20:354** T24:351
739	A Software Package for Unconstrained Optimization Using Tensor Methods	**T20:518**
742	L2CXFT: A FORTRAN Subroutine for Least-Squares Data Fitting with Nonnegative Second Divided Differences	**T21:98**
744	A Stochastic Algorithm for Global Optimization with Constraints	**T21:194**
765	STENMIN: A Software Package for Large, Sparse Unconstrained Optimization Using Tensor Methods	**T23:81**
768	TENSOLVE: A Software Package for Solving Systems of Nonlinear Equations and Nonlinear Least-squares Problems Using Tensor Methods	**T23:174**
774	Fortran Subroutines for Generating Box-Constrained Optimization Problems	**T23:448**
778	L-BFGS-B: Fortran Subroutines for Large-Scale Bound-Constrained Optimization	**T23:550**

F1 : Matrix Operations, including Inversion

42	INVERT	**C4:176** C4:498 C6:38 C6:445
50	Inverse of a Finite Segment of the Hilbert Matrix	**C4:179** C5:50 C6:38
51	Adjust Inverse of a Matrix when an Element is Perturbed	**C4:180** C5:391
52	A Set of Test Matrices	**C4:180** C4:339 C4:498 C5:438 C6:39 C6:446

Number	Algorithm Title	References
58	Matrix Inversion	**C4:236** C5:347 C5:438 C5:438 C5:606
66	INVRS	**C4:322** C5:50 C5:348
67	CRAM	**C4:322** C5:348
120	Matrix Inversion II	**C5:437** C6:40 C6:445
140	Matrix Inversion	**C5:556** C6:448
150	SYMINV2	**C6:67** C6:390 C6:390 C7:148
166	MonteCarlo	**C6:164** C6:523
197	Matrix Division	**C6:443** C7:148
230	Matrix Permutation	**C7:347**
231	Matrix Inversion	**C7:347** C8:220
274	Generation of Hilbert Derived Test Matrix	**C9:11** C12:407
287	Matrix Triangulation with Integer Arithmetic	**C9:513**
298	Determination of the Square Root of a Positive Definite Matrix	**C10:182** C12:325
319	Triangular Factors of Modified Matrices	**C11:12**
325	Adjustment of the Inverse of a Symmetric Matrix When Two Symmetric Elements are Changed	**C11:118**
348	Matrix Scaling by Integer Programming	**C12:212**
358	Singular Value Decomposition of a Complex Matrix	**C12:564**
380	In-Situ Transposition of a Rectangular Matrix	**C13:324** C13:327 C15:49
467	Matrix Transposition in Place	**C16:692** T5:520
508	Matrix Bandwidth and Profile Reduction	**T2:375** T8:221
509	A Hybrid Profile Reduction Algorithm	**T2:378** T8:221
513	Analysis of In-Situ Transposition	**T3:104** T5:520
529	Permutations to Block Triangular Form	**T4:189**
539	Basic Linear Algebraic Subprograms for FORTRAN Usage	**T5:324** T8:403 T9:140
575	Permutations for a Zero-Free Diagonal	**T7:387**
581	An Improved Algorithm for Computing the Singular Value Decomposition	**T8:84**
601	A Sparse Matrix Package – Part II: Special Cases	**T9:344**
636	FORTRAN Subroutines for Estimating Sparse Hessian Matrices	**T11:378**
645	Subroutines for Testing Programs that Compute the Generalized Inverse of a Matrix	**T12:274**
653	Translation of Algorithm 539: PC-BLAS Basic Linear Algebra Subprograms for FORTRAN Usage with the INTEL8087 80287 Numeric Data Processor	**T13:311**
656	An Extended Set of Basic Linear Algebra Subprograms: Model Implementation and Test Programs	**T14:18**
663	Translation of Algorithm 539: Basic Linear Algebra Subprograms for FORTRAN Usage in FORTRAN 200 for the Cyber 205	**T14:177**
674	FORTRAN Codes for Estimating the One-Norm of a Real or Complex Matrix, with Applications to Condition Estimation	**T14:381**

Number	Algorithm Title	References
679	A Set of Level 3 Basic Linear Algebra Subprograms	**T16:18**
692	Model Implementation and Test Package for the Sparse Basic Linear Algebra Subprograms	**T17:264**
694	A Collection of Test Matrices in MATLAB	**T17:289**
695	Software for a New Modified Cholesky Factorization	**T17:306**
705	A FORTRAN-77 Software Package for Solving the Sylvester Matrix Equation $AXB^T + CXD^T = E$	**T18:232**
753	TENPACK: A LAPACK-Based Library for the Computer Manipulation of Tensor Products	**T22:24**
767	A Fortran 77 Package for Column Reduction of Polynomial Matrices	**T23:111**
784	GEMM-Based Level 3 BLAS: Portability and Optimization Issues	**T24:303**

F2 : Eigenvalues and Eigenvectors of a Matrix

85	Jacobi	**C5:208** C5:440 C6:447
104	Reduction to Jacobi	**C5:387**
122	Tridiagonal Matrix	**C5:482** C7:144
183	Reduction of a Symmetric Bandmatrix to Triple Diagonal Form	**C6:315**
253	Eigenvalues of a Real Symmetric Matrix by the QR Method	**C8:217** C10:376
254	Eigenvalues and Eigenvectors of a Real Symmetric Matrix by the QR Method	**C8:218** C10:376
270	Finding Eigenvalues by Gaussian Elimination	**C8:668**
297	Eigenvalues and Eigenvectors of the Symmetric System $(\mathbf{A} - \lambda\mathbf{B})\mathbf{X} = \mathbf{0}$	**C10:181**
343	Eigenvalues and Eigenvectors of a Real Generator Matrix	**C11:820** C13:122 C13:694 C15:466
384	Eigenvalues and Eigenvectors of a Real Symmetric Matrix	**C13:369** C13:750
405	Roots of Matrix Pencils: The Generalized Eigenvalue Problem	**C14:113** C15:1075
464	Eigenvalues of a Real Symmetric Tridiagonal Matrix	**C16:689**
496	The LZ Algorithm to Solve the Generalized Eigenvalue Problem for Complex Matrices	**T1:271** T2:396
506	HQR3 and EXCHNG: FORTRAN Subroutines for Calculating and Ordering the Eigenvalues of a Real Upper Hessenberg Matrix	**T2:275** T8:219
516	An Algorithm for Obtaining Confidence Intervals and Point Estimates Based on Ranks in the Two-Sample Location Problem	**T3:183**
517	A Program for Computing the Conditions Numbers of Matrix Eigenvalues Without Computer Eigenvector	**T3:186**
530	An Algorithm for Computing the Eigensystem of Skew-Symmetric Matrices and a Class of Symmetric Matrices	**T4:286**

Number	Algorithm Title	References
535	The QZ Algorithm to Solve the Generalized Eigenvalue Problem for Complex Matrices	**T4:404** T8:402 T10:476
538	Eigenvectors and Eigenvalues of Real Generalized Symmetric Matrices by Simultaneous Iteration	**T5:118**
560	JNF: An Algorithm for Numerical Computation of the Jordan Normal Form of a Complex Matrix	**T6:437**
570	LOPSI: A Simultaneous Iteration Algorithm for Real Matrices	**T7:230**
589	SICEDR: A FORTRAN Subroutine for Improving the Accuracy of Computed Matrix Eigenvalues	**T8:371**
590	DSUBSP AND EXCHQZ: FORTRAN Subroutines for Computing Deflating Subspaces With Specified Spectrum	**T8:376** T10:207
598	An Algorithm to Compute Solvents of the Matrix Equation $AX^2 + BX + C = 0$	**T9:246**
640	Efficient Calculation of Frequency Response Matrices from State Space Models	**T12:26**
646	PDFIND: A Routine to Find a Positive Definite Linear Combination of Two Real Symmetric Matrices	**T12:278**
696	An Inverse Rayleigh Iteration for Complex Band Matrices	**T17:335**
710	FORTRAN Subroutines for Computing the Eigenvalues and Eigenvectors of a General Matrix by Reduction to General Tridiagonal Form	**T18:392**
718	A FORTRAN Subroutine to Solve the Eigenvalue Allocation Problem for Single-Input Systems	**T19:224**
730	An Implementaion of a Divide and Conquer Algorithm for the Unitary Eigenproblem	**T18:292**
747	A FORTRAN Subroutine to Solve the Eigenvalue Assignment Problem for Multiiput Systems Using State Feedback	**T21:299**
776	SRRIT: A Fortran Subroutine to Calculate the Dominant Invariant Subspace of a Nonsymmetric Matrix	**T23:494**

F3 : Determinants

41	Evaluation of Determinant	**C4:176** C7:144 C6:520 C9:686
159	Determinant	**C6:104** C6:739
170	Reduction of a Matrix Containing Polynomial Elements	**C6:165** C6:450 C7:421
224	Evaluation of Determinant	**C7:243** C7:702
269	Determinant Evaluation	**C8:668** C9:686

F4 : Simultaneous Linear Equations

16	Crout with Pivoting	**C3:507** C3:540 C4:154
17	TRDIAG	**C3:508**
24	Solution of Tri-Diagonal Linear Equations	**C3:602**

Number	Algorithm Title	References
43	Crout with Pivoting II	**C4:176** C4:182 C6:445
92	Simultaneous System of Equations and Matrix Inversion Routine	**C5:286**
107	Gauss's Method	**C5:388** C6:39 C6:445
126	Gauss' Method	**C5:511**
135	Crout with Equilibration and Iteration	**C5:553** C5:557 C7:421 C8:104
195	BANDSOLVE	**C6:441** C15:1074
220	Gauss-Seidel	**C6:739** C7:349
238	Conjugate Gradient Method	**C7:481**
288	Solution of Simultaneous Linear Diophantine Equations	**C9:514**
290	Linear Equations Exact Solutions	**C9:683**
328	Chebyshev Solution to An Overdetermined Linear System	**C11:428** C12:326
406	Exact Solution of Linear Equations Using Residue Arithmetic	**C14:180** C16:311
408	A Sparse Matrix Package (Part I)	**C14:265** C16:311 C16:578 T3:303 T4:295 T6:456
423	Linear Equation Solver	**C15:274**
432	Solution of the Matrix Equation $\mathbf{A}x + x\mathbf{B} = \mathbf{C}$	**C15:820**
470	Linear Systems with Almost Tridiagonal Matrix	**C16:760**
478	Solution of an Overdetermined System of Equations in the L_1 Norm	**C17:319** C18:277
495	Solution of an Overdetermined System of Linear Equations in the Chebyshev Norm	**T1:264**
512	A Normalized Algorithm for the Solution of Positive Definite Symmetric Quindiagonal Systems of Linear Equations	**T3:96**
522	ESOLVE: Congruence Techniques for the Exact Solution of Integer Systems of Linear Equations	**T3:404**
533	NSPIV: A FORTRAN Subroutine for Sparse Gaussian Elimination with Partial Pivoting	**T4:391**
544	L2A and L2B Weighted Least Squares Solutions by Modified Gram-Schmidt with Iterative Refinement	**T5:494**
546	SOLVEBLOK	**T6:88**
551	A FORTRAN Subroutine for the L_1 Solution of Overdetermined Systems of Linear Equations	**T6:228**
552	Solution of the Constrained L_1 Linear Approximation Problem	**T6:231**
563	A Program for Linearly Constrained Discrete L_1 Problems	**T6:609**
576	A FORTRAN Program for Solving $\mathbf{A}x = b$	**T7:391**
578	Solution of Real Linear Equations in a Paged Virtual Store	**T7:537**
582	The Gibbs-Poole-Stockmeyer and Gibbs-King Algorithms for Reordering Sparse Matrices	**T8:190**
586	ITPACK 2C: A FORTRAN Package for Solving Large Sparse Linear Systems by Adaptive Accelerated Iterative Methods	**T8:302**
587	Two Algorithms for the Linearly Constrained Least Squares Problem	**T8:323** T15:257

Number	Algorithm Title	References
603	COLROW and ARCECO: FORTRAN Packages for Solving Almost Block Diagonal Linear Systems by Modified Alternate Row and Column Elimination	**T9:376** T14:196
618	FORTRAN Subroutines for Estimating sparse Jacobian Matrices	**T10:346**
633	An Algorithm for Linear Dependency Analysis of Multivariate Data	**T11:170**
635	An Algorithm for the Solution of Systems of Complex Linear Equations in the L_∞ Norm with Constraints on the Unknowns	**T11:242**
641	Exact Solution of General Systems of Linear Equations	**T12:149**
664	A Gauss Algorithm to Solve Systems with Large Banded Matrices Using Random Access Disk Storage	**T14:257**
701	GOLIATH – A Software System for the Exact Analysis of Rectangular Rank-Deficient Sparse Rational Linear Systems	**T17:519**
704	ABDPACK and ABBPACK – FORTRAN Programs for the Solution of Almost Block Diagonal Linear Systems Arising in Spline Collocation at Gaussian Points with Monomial Basis Functions	**T18:205**
729	FORTRAN Subroutines for General Toeplitz Systems	**T18:256**
740	FORTRAN Subroutines to Compute Improved Incomplete Cholesky Factorizations	**T21:18**
741	Least-Squares Solution of a Linear, Bordered, Block-Diagonal System of Equations	**T21:20**

F5 : Orthogonalization

Number	Algorithm Title	References
127	Ortho	**C5:511** C13:122
580	QRUP: A Set of FORTRAN Routines for Updating QR Factorizations	**T7:548** T8:405
686	FORTRAN Subroutines for Updating the QR Decomposition	**T16:369**
782	Codes for Rank-Revealing QR Factorizations of Dense Matrices	**T24:254**

G1 : Simple Calculations on Statistical Data

Number	Algorithm Title	References
208	Discrete Convolution	**C6:615**
212	Frequency Distribution	**C6:617**
289	Confidence Interval For a Ratio	**C9:514**
330	Factorial Analysis of Variance	**C11:431**
359	Factorial Analysis of Variance	**C12:631** C13:449
451	Chi-Square Quantiles	**C16:483** C18:116
616	Fast Computation of the Hodges-Lehman Location Estimator	**T10:265**
727	Quantile Estimation Using Overlapping Batch Statistics	**T20:100**
762	LLDRLF, Log-Likelihood and Some Derivatives for Log-F Models	**T22:372**

Number	Algorithm Title	References
	G2 : Correlation and Regression Analysis	
39	Correlation Coefficients with Matrix Multiplication	**C4:152**
142	Triangular Regression	**C5:603**
366	Regression Using Certain Direct Product Matrices	**C12:687**
367	Analysis of Variance for Balanced Experiments	**C12:688**
434	Exact Probabilities for $R \times C$ Contingency Tables	**C15:991** C17:326 C18:117 T2:108
583	LSQR: Sparse Linear Equations and Least-Square Problems	**T8:195**
591	A Comprehensive Matrix-Free Algorithm for Analysis of Variance	**T8:383**
615	The Best Subset of Parameters in Least Absolute Value Regression	**T10:202**
642	A Fast Procedure for Calculating Minimum Cross-Validation Cubic Smoothing Splines	**T12:150**
643	FEXACT: A FORTRAN Subroutine for Fisher's Exact Test on Unordered $r \times c$ Contingency Tables	**T12:154** T19:484
675	FORTRAN Subroutines for Computing the Square Root Covariance Filter and Square Root Information Filter in Dense or Hessenberg Forms	**T15:243**
676	ODRPACK: Software for Weighted Orthogonal Distance Regression	**T15:348**
717	Subroutines for Maximum Likelihood and Quasi-Likelihood Estimation of Parameters in Nonlinear Regression Models	**T19:109**
	G5 : Random Number Generators	
121	Normdev	**C5:482** C8:556
133	Random	**C5:553** C5:606 C6:105 C6:167
200	Normal Random	**C6:444** C8:556
247	Radical-Inverse Quasi-Random Point Sequence	**C7:701**
266	Pseudo-Random Numbers	**C8:605** C9:687 C9:687 C15:1072
267	Random Normal Deviate	**C8:606**
294	Uniform Random	**C10:40**
334	Normal Random Deviates	**C11:498** C12:281 T8:89
342	Generator of Random Numbers Satisfying the Poisson Distribution	**C11:819**
369	Generator of Random Numbers Satisfying the Poisson Distribution	**C13:49**
370	General Random Number Generator	**C13:49** C15:467
381	Random Vectors Uniform In Solid Angle	**C13:326** C15:468
425	Generation of Random Correlated Normal Variables	**C15:355** C17:325

Number	Algorithm Title	References
441	Random Deviates from the Dipole Distribution	**C16:51**
488	A Gaussian Pseudo-Random Number Generator	**C17:704**
599	Sampling From Gamma and Poisson Distributions	**T9:255**
659	Implementing Sobol's Quasirandom Sequence Generator	**T14:88**
668	H2PEC: Sampling from the Hypergeometric Distribution	**T14:397**
678	BTPEC: Sampling from the Binomial Distribution	**T15:394**
712	A Normal Random Number Generator	**T18:454**
738	Programs to Generate Niederreiter's Low-Discrepancy Sequences	**T20:494**
780	Exponential Pseudorandom Distribution	**T24:102**

G6 : Permutations and Combinations

Number	Algorithm Title	References
71	Permutation	**C4:497** C5:209 C5:209 C5:439
86	Permute	**C5:208** C5:440
87	Permutation Generator	**C5:209** C5:440 C5:514 C10:452
94	Combination	**C5:344** C5:557 C5:606
102	Permutation in Lexicographical Order	**C5:346** C10:452
115	Perm	**C5:434** C5:514 C5:606
130	Permute	**C5:551** C10:452
152	NEXCOM	**C6:68** C6:385
154	Combination in Lexicographical Order	**C6:103** C6:449
155	Combination in Any Order	**C6:103** C6:449
156	Algebra of Sets	**C6:103** C6:450
160	Combinatorial of M Things Taken N at a Time	**C6:161** C6:450 C6:618
161	Combinatorial of M Things Taken One at a Time, Two at a Time, Up to N at a Time	**C6:161** C6:450 C6:619
202	Generation of Permutations in Lexicographical Order	**C6:517** C8:556 C10:452
235	Random Permutation	**C7:420** C8:445
242	Permutations of a Set With Repetitions	**C7:585**
250	Inverse Permutation	**C8:104** C8:670
306	Permutations with Repetitions	**C10:450**
308	Generation of Permutations in Pseudolexicographic Order	**C10:452** C12:638
317	Permutation	**C10:729**
323	Generation of Permutations in Lexicographic Order	**C11:117** C12:512 C16:577
329	Distributed of Indistinguishable Objects Into Distinguishable Slots	**C11:430** C12:187
361	Permanent Function of a Square Matrix I and II	**C12:634** C13:376
362	Generation of Random Permutations	**C12:634**
382	Combinations of M Out of N Objects	**C13:368** C13:376

Number	Algorithm Title	References
383	Permutations of a Set with Repetitions	**C13:368** C13:376
452	Enumerating Combinations of m Out of n Objects	**C16:485**
466	Four Combinatorial Algorithms	**C16:690**
515	Generation of a Vector from the Lexicographical Index	**T3:180**
	G7 : Subset Generators	
81	Economising a Sequence 1	**C5:166**
82	Economising a Sequence 2	**C5:167**
477	Generator of Set-Partitions to Exactly R Subsets	**C17:224**
482	Transitivity Sets	**C17:470**
	H : Operations Research, Graph Structure	
27	Assignment	**C3:603** C6:618 C6:739
40	Critical Path Scheduling	**C4:152** C4:392 C5:513 C7:349
69	Chain Tracing	**C4:392**
83	Optimal Classification of Objects	**C5:167**
96	Ancestor	**C5:344** C6:104
97	Shortest Path	**C5:345**
119	Evaluation of a Pert Network	**C5:436** C8:330
141	Path Matrix	**C5:556**
153	GOMORY	**C6:68** C6:449
217	Minimum Excess Cost Curve	**C6:737** C11:573
219	Topological Ordering for Pert Networks	**C6:738** T3:303
248	Netflow	**C8:103** C11:633 C11:633
258	Transport	**C8:381** C8:445 C10:453
264	Map of Partitions into Integers	**C8:493**
285	The Mutual Primal-Dual Method	**C9:326** C10:453
286	Examination Scheduling	**C9:433** C9:795
293	Transportation Problem	**C9:869** C10:453 C11:271
324	Maxflow	**C11:117** C16:309
333	Minit Algorithm For Linear Programming	**C11:437** C12:408 C14:50 C16:310 C16:310
336	Netflow	**C11:631** C13:192
341	Solution of Linear Programs in 0-1 Variables by Implicit Enumeration	**C11:782** C12:692 C13:263
350	Simplex Method Procedure Employing LU Decomposition	**C12:275**
354	Generator of Spanning Trees	**C12:511**
360	Shortest-Path Forest with Topological Ordering	**C12:632**
394	Decision Table Translation	**C13:571** C15:1074

Number	Algorithm Title	References
397	An Integer Programming Problem	**C13:620** C15:469
399	Spanning Tree	**C13:621**
411	Three Procedures for the Stable Marriage Problem	**C14:491**
415	Algorithm for the Assignment Problem (Rectangular Matrices)	**C14:805**
422	Minimal Spanning Tree	**C15:273** C16:448
430	Immediate Predominators in a Directed Graph	**C15:777**
431	A Computer Routine for Quadratic and Linear Programming Problems	**C15:818** C17:157 C17:590
447	Efficient Algorithms for Graph Manipulation	**C16:372**
449	Solution of Linear Programming Problems in 0-1 Variables	**C16:445**
456	Routing Problem	**C16:572** C17:706
457	Finding All Cliques of an Undirected Graph	**C16:575**
459	The Elementary Circuits of a Graph	**C16:632** C18:119
481	Arrow to Precedence Network Transformation	**C17:467**
491	Basic Cycle Generation	**C18:275**
492	Generation of All the Cycles of a Graph from a Set of Basic Cycles	**C18:310**
520	An Automatic Revised Simplex Method for Constrained Resource Network Scheduling	**T3:295**
548	Solution of the Assignment Problem	**T6:104**
557	PAGP A Partitioning Algorithm for (Linear) Goal Programming Problems	**T6:429**
558	A Program for the Multifacility Location Problem with Rectilinear Distance by the Minimum-cut Approach	**T6:430**
562	Shortest Path Lengths	**T6:450** T9:260
595	An Enumerative Algorithm for Finding Hamiltonian Circuits in a Directed Graph	**T9:131**
608	Approximate Solution of the Quadratic Assignment Problem	**T9:461**
613	Minimum Spanning Tree for Moderate Integer Weights	**T10:108**
632	A Program for the $0-1$ Multiple Knapsack Problem	**T11:135**
750	CDT: A Subroutine for the Exact Solution of Large-Scale, Asymmetric Traveling Salesman Problems	**T21:410**
754	FORTRAN Subroutines for Approximate Solution of Dense Quadratic Assignment Problems Using GRASP	**T22:104**
769	Fortran Subroutines for Approximate Solution of Sparse Quadratic Assignment Problems Using GRASP	**T23:196**
787	Fortran Subroutines for Approximate Solution of Maximum Independent Set Problems Using GRASP	**T24:386**
797	Fortran Subroutines for Approximate Solution of Graph Planarization Problems Using GRASP	**T25:341**

I5 : Input – Composite

239	Free Field Read	**C7:481**
249	Outreal N	**C8:104**
335	A Set of Basic Input-Output Procedures	**C11:567**

Number	Algorithm Title	References
	J6 : Plotting	
162	XYMOVE Plotting	**C6:161** C6:450 C7:482
278	Graph Plotter	**C9:88**
412	Graph Plotter	**C14:492** C16:489
420	Hidden-Line Plotting Program	**C15:100** C16:448 C16:578 C17:324 C17:324 C17:706
463	Algorithms SCALE1, SCALE2, and SCALE3 for Determination of Scales on Computer Generated Plots	**C16:639**
475	Visible Surface Plotting Program	**C17:152** C18:202 C18:276 C18:277 T1:381 T2:109 T5:521
483	Masked Three-Dimensional Plot Program with Rotations	**C17:520** T1:285
531	Contour Plotting	**T4:290**
625	A Two-Dimensional Domain processor	**T10:453**
626	TRICP: A Contour Plot Program for Triangular Meshes	**T10:473**
657	Software for Plotting Contour Surfaces of a Function of Three Variables	**T14:42** T16:109
671	FARB-E-2D: Fill Area with Bicubics on Rectangles – A Contour Plot Program	**T15:79**
781	Generating Hilbert's Space-Filling Curve by Recursion	**T24:184**
	K2 : Relocation	
173	ASSIGN	**C6:311** C6:619 C6:619
284	Interchange of Two Blocks of Data	**C9:326** T2:392
302	Transpose Vector Stored Array	**C10:292** C12:326
	L2 : Compiling	
265	Find Precedence Functions	**C8:604**
	M1 : Sorting	
23	Math Sort	**C3:601** C4:238
63	Partition	**C4:321** C5:439 C6:446
64	Quicksort	**C4:321** C5:439 C6:446 C17:143
65	Find	**C4:321** C5:439 C6:446
76	Sorting Procedures	**C5:48** C5:348

Number	Algorithm Title	References
113	Treesort	**C5:434**
143	Treesort 1	**C5:604**
144	Treesort 2	**C5:604**
151	Location of a Vector in a Lexicographically Ordered List	**C6:68**
175	Shuttle Sort	**C6:312** C6:619 C6:739 C7:296
201	Shellsort	**C6:445** C7:349 C13:373 C17:143
207	Stringsort	**C6:615** C7:585 C17:143
232	Heapsort	**C7:347**
245	Treesort 3	**C7:701** C8:445 C13:371 C17:143
271	Quickersort	**C8:669** C9:354 C17:143
347	An Efficient Algorithm for Sorting with Minimal Storage	**C12:185** C13:54 C13:624 T2:290
402	Increasing the Efficiency of Quicksort	**C13:693** C16:311 C17:143
410	Partial Sorting	**C14:357**
426	Merge Sort Algorithm	**C15:357** C17:706 T2:290
489	The Algorithm SELECT – for Finding the $i\mathrm{th}$ Smallest of n Elements	**C18:173** T2:301

M2 : Data Conversion and Scaling

673	Dynamic Huffman Coding	**T15:158**

O2 : Simulation of Computing Structure

100	Add Item to Chain-Linked List	**C5:346**
101	Remove Item From Chain-Linked List	**C5:346**
137	Nesting of For Statement I	**C5:555**
138	Nesting of For Statement II	**C5:555**
268	Algol 60 Reference Language Editor	**C8:667** C12:407

R2 : Symbol Manipulation

377	Symbolic Expansion of Algebraic Expressions	**C13:191**
628	An Algorithm for Constructing Canonical Bases of Polynomial Ideals	**T11:66**
746	PCOMP: A FORTRAN Code for Automatic Differentiation	**T21:233**
755	ADOL-C: A Package for the Automatic Differentiation of Algorithms Written in C/C++	**T22:131**

Number	Algorithm Title	References
	S : Approximation of Special Functions	
714	CELEFUNT: A Portable Test Package for Complex Elementary Functions	**T19:1**
715	SPECFUN: A Portable FORTRAN Package of Special Function Routines and Test Drivers	**T19:22** T22:258
	S03	
19	Binomial Coefficients	**C3:540** C5:347 C5:438
33	Factorial	**C4:106**
	S13	
14	Complex Exponential Integral	**C3:406**
20	Real Exponential Integral	**C3:540** C4:105 C4:182
108	Definite Exponential Integrals A	**C5:388** C5:393
109	Definite Exponential Integrals B	**C5:388** C5:393
385	Exponential Integral $E_i(x)$	**C13:446** C13:448 C13:750 C15:1074
471	Exponential Integrals	**C16:761**
556	Exponential Integrals	**T6:420** T9:525
609	A Portable FORTRAN Subroutine for the Bickley Functions $Ki_n(x)$	**T9:480**
683	A Portable FORTRAN Subroutine for Exponential Integrals of a Complex Argument	**T16:178**
779	Fermi-Dirac Functions of Order -1/2, 1/2, 3/2, 5/2	**T24:1**
	S14	
31	Gamma Function	**C4:105** C5:605 C6:38
34	Gamma Function	**C4:106** C5:391 C9:685
54	Gamma Function for Range 1 to 2	**C4:180** C9:685
80	Reciprocal Gamma Function of Real Argument	**C5:166** C9:685
147	PSIF	**C5:605** C6:168 C12:691
179	Incomplete Beta Ratio	**C6:314** C10:375 C17:156 T2:207
221	Gamma Function	**C7:143** C7:586 C9:685
222	Incomplete Beta Function Ratios	**C7:143** C7:244
225	Gamma Function with Controlled Accuracy	**C7:295** C7:586

Number	Algorithm Title	References
291	Logarithm of Gamma Function	**C9:684** C9:685 C11:14
309	Gamma Function with Arbitrary Precision	**C10:511**
321	t-Test Probabilities	**C11:115** C13:124
322	F-Distribution	**C11:116** C12:39 C14:117
344	Student's t-Distribution	**C12:37** C13:124 C13:449
346	F-Test Probabilities	**C12:184** T14:288
349	Polygamma Functions with Arbitrary Precision	**C12:213** T1:380
395	Student's f-Distribution	**C13:617** T5:238 T7:247
396	Student's f-Quantiles	**C13:619** T5:238 T7:250
404	Complex Gamma Function	**C14:48** C16:489
421	Complex Gamma Function with Error Control	**C15:271**
435	Modified Incomplete Gamma Function	**C15:993** T4:296
442	Normal Deviate	**C16:51**
465	Student's t Frequency	**C16:690**
487	Exact Cumulative Distribution of the Kolmogorov-Smirnov Statistic for Small Samples	**C17:703** T2:111 T3:285
518	Incomplete Bessel Function I_0: The von Mises Distribution	**T3:279**
519	Three Algorithms for Computing Kolmogorov-Smirnov Probabilities with Arbitrary Boundaries and Certification of Algorithm 487	**T3:285**
542	Incomplete Gamma Functions	**T5:482**
571	Statistics for Von Mises' and Fisher's Distribution of Directions: $I_1(x)/I_0(x)$ $I_{1.5}(x)/I_{.5}(x)$	**T7:233**
610	A Portable FORTRAN Subroutine for the Derivation of the Psi Function	**T9:494**
654	FORTRAN Subroutines for Computing the Incomplete Gamma Function Ratios and their Inverse	**T13:318**
708	Significant Digit Computation of the Incomplete Beta Function Ratios	**T18:360** T20:393
724	Program to Calculate F-Percentiles	**T19:481**

S15

11	Evaluation of the Hermite Polynomial $H_n(X)$ by Recursion	**C3:353**
123	Real Error Function $\mathrm{erf}(x)$	**C5:483** C6:316 C6:618 C7:145 C10:377
180	Error Function – Large x	**C6:314** C10:377
181	Complimentary Error Function – Large x	**C6:315** C7:702 C10:377

Number	Algorithm Title	References
185	Normal Probability for Curve Fitting	**C6:386**
209	Gauss	**C6:616** C7:148 C7:482 C10:377
226	Normal Distribution Function	**C7:295** C10:377
272	Procedure for the Normal Distribution Functions	**C8:789** C10:377 C11:498
299	Chi-Squared Integral	**C10:243** C11:271 T2:393 T11:185
304	Normal Curve Integral	**C10:374** C10:377 C11:271 C12:565 C13:624
363	Complex Error Function	**C12:635** C15:465
462	Bivariate Normal Distribution	**C16:638**
521	Repeated Integrals of the Coerror Function	**T3:301**
680	Evaluation of the Complex Error Function	**T16:47**
725	Computation of the Multivariate Normal Integral	**T18:470**
745	Computation of the Complete and Incomplete Fermi-Dirac Integral	**T21:221**

S16

13	Evaluation of the Legendre Polynomial $P_n(X)$ by Recursion	**C3:353** C4:105 C4:181
47	Associated Legendre Functions of the First Kind for Real or Imaginary Arguments	**C4:178** C6:446 C12:635
62	A Set of Associate Legendre Polynomials of The Second Kind	**C4:320** C4:544
259	Legendre Functions for Arguments Larger than One	**C8:488** T3:204

S17

21	Bessel Function for a Set of Integer Orders	**C3:600** C8:219
22	Riccati-Bessel Functions of First and Second Kind	**C3:600** C13:448
44	Bessel Functions Computed Recursively	**C4:177**
49	Spherical Neumann Function	**C4:179** T4:295
124	Hankel Function	**C5:483** C8:790
163	Modified Hankel Function	**C6:161** C6:522
236	Bessel Functions of the First Kind	**C7:479** C8:105 T1:282
484	Evaluation of the Modified Bessel Functions $K_0(z)$ and $K_1(z)$ for Complex Arguments	**C17:524**
498	Airy Functions using Chebyshev Series Approximations	**T1:372** T7:404
597	Sequence of Modified Bessel Functions of the First Kind	**T9:242**
713	Portable Vectorized Software for Bessel Function Evaluation	**T18:456**
794	Numerical Hankel Transform by the Fortran Program HANKEL	**T25:240**

S18

Number	Algorithm Title	References
5	Bessel Function I Series Expansion	**C3:240**
6	Bessel Function I Asymptotic Expansion	**C3:240**
214	q-Bessel Functions $I_n(t)$	**C6:662** C7:349
228	Q-Bessel Functions $\bar{I}_n(t)$	**C7:295**
511	CDC 6600 Subroutines IBESS and JBESS for Bessel Functions $I_\nu(x)$, $J_\nu(x)$, $\nu \geq O$ $x \geq O$	**T3:93** T4:411

S19

Number	Algorithm Title	References
57	Ber or Bei Function	**C4:181** C5:392 C5:438
644	A Portable Package for Bessel Functions of a Complex Argument and Non-Negative Order	**T12:265** T16:404 T21:388

S20

Number	Algorithm Title	References
88	Evaluation of Asymptotic Expression for the Fresnel Sine and Cosine Integrals	**C5:280** C6:618
89	Evaluation of the Fresnel Sine Integral	**C5:280** C6:618
90	Evaluation of the Fresnel Cosine Integral	**C5:281** C6:618
213	Fresnel Integrals	**C6:617** C7:661
244	Fresnel Integrals	**C7:660**
301	Airy Function	**C10:291** C10:453
505	A List Insertion Sort for Keys with Arbitrary Key Distribution	**T2:204**
723	Fresnel Integrals	**T19:452** T22:498

S21

Number	Algorithm Title	References
55	Complete Elliptic Integral of The First Kind	**C4:180** C6:166
56	Complete Elliptic Integral of The Second Kind	**C4:180** C9:12
73	Incomplete Elliptic Integrals	**C4:543** C4:544 C5:514 C6:69 C6:167
149	Complete Elliptic Integral	**C5:605** C6:166 T4:95
165	Complete Elliptic Integrals	**C6:163** C12:38
549	Weierstrass' Elliptic Functions	**T6:112**
577	Algorithms for Incomplete Elliptic Integrals	**T7:398**
736	Hyperelliptic Integrals and the Surface Measure of Ellipsoids	**T20:427**

S22

Number	Algorithm Title	References
10	Evaluation of the Chebyshev Polynomial $T_n(X)$ by Recursion	**C3:353** C4:181
12	Evaluation of the Laguerre Polynomial $L_n(X)$ by Recursion	**C3:353**
36	Tchebycheff	**C4:151**
110	Quantum Mechanical Integrals of Slater-Type Orbitals	**C5:389** C5:393
111	Molecular-Orbital Calculation of Molecular Interactions	**C5:390**
132	Quantum Mechanical Integrals Over all Slater-Type Integrals	**C5:551**

Number	Algorithm Title	References
184	Erlang Probability for Curve Fitting	**C6:386**
191	Hypergeometric	**C6:388** C7:244 C17:589
192	Confluent Hypergeometric	**C6:388** C7:244
227	Chebyshev Polynomial Coefficients	**C7:295**
282	Derivatives of e^x/x, $\cos(x)/x$ and $\sin(x)/x$	**C9:272** C13:53
292	Regular Coulomb Wave Functions	**C9:793** C12:278 C12:280 C13:573
300	Coulomb Wave Functions	**C10:244** C12:279 C12:692 C16:308
327	Dilogarithm	**C11:270**
332	Jacobi Polynomials	**C11:436** C13:449 C18:116
352	Characteristic Values and Associated Solutions of Mathieu's Differential Equation	**C12:399** C13:750 C15:1074
388	Rademacher Function	**C13:510**
389	Binary Ordered Walsh Functions	**C13:511**
390	Sequency Ordered Walsh Functions	**C13:511**
490	The Dilogarithm Function of a Real Argument	**C18:200** T2:112
537	Characteristic Values of Mathieu's Differential Equations	**T5:112**
707	CONHYP: A Numerical Evaluator of the Confluent Hypergeometric Function for Complex Arguments of Large Magnitudes	**T18:345**
757	MISCFUN, A Software Package to Compute Uncommon Special Functions	**T22:288**
	S23	
234	Poisson-Charlier Polynomials	**C7:420** C8:105
	Z : All Others	
45	INTEREST	**C4:178** C6:520
112	Position of Point Relative to Polygon	**C5:434** C5:606
117	Magic Square (Even Order)	**C5:435** C5:440 C6:39 C6:105
118	Magic Square (Odd Order)	**C5:436** C5:440 C5:606 C6:39 C6:105
136	Enlargement of a Group	**C5:555**
148	Term of Magic Square	**C5:605** C6:168 C6:168
199	Conversions Between Calendar Date and Julian Day Number	**C6:444** C7:661
240	Coordinates On An Ellipsoid	**C7:546**
246	Graycode	**C7:701** C8:382 T1:285 T11:441

Number	Algorithm Title	References
252	Vector Coupling or Clebsch-Gordan Coefficients	**C8:217**
260	6-j Symbols	**C8:492**
261	9-j Symbols	**C8:492**
355	An Algorithm for Generating Ising Configuration	**C12:562**
364	Coloring Polygonal Regions	**C12:685**
391	Unitary Symmetric Polynomials	**C13:512** C15:49
398	Tableless Date Conversion	**C13:621** C15:918
428	Hu-Tucker Minimum Redundancy Alphabetic Coding Method	**C15:360** C16:490
444	An Algorithm for Extracting Phrases in a Space-Optimal Fashion	**C16:183**
445	Binary Pattern Reconstruction from Projections	**C16:185** C16:186
455	Analysis of Skew Representations of the Symmetric Group	**C16:571**
479	A Minimal Spanning Tree Clustering Method	**C17:321** C18:119 T2:110
499	An Efficient Scanning Technique	**T2:82**
523	CONVEX: A New Convex Hull Algorithm for Planar Sets	**T3:411**
528	Framework for a Portable Library	**T4:177** T5:524 T25:123
532	Software for Roundoff Analysis	**T4:388**
536	An Efficient One-Way Enciphering Algorithm	**T5:108**
550	Solid Polyhedron Measures	**T6:121**
561	FORTRAN Implementation of Heap Programs for Efficient Table Maintenance	**T6:444**
564	A Test Problem Generator for Discrete Linear L_1 Approximation Problems	**T6:615**
568	PDS – A Portable Directory System	**TPL3:162**
588	Fast Hankel Transforms Using Related and Lagged Convolutions	**T8:369**
594	Software for Relative Error Analysis	**T9:125**
605	PBASIC – A Verifier Program for ANSI Minimal Basic	**T9:391**
606	NITPACK – An Interactive Tree Package	**T9:418**
607	Text Exchange System: A Transportable System for Management and Exchange of Programs and Other Text	**T9:427**
620	References and Keywords for *Collected Algorithms from ACM*	**T10:359** T11:305 T16:401
622	A Simple Macroprocessor	**T10:410** T24:336
709	Testing Algorithm Implementations	**T18:375**
735	Wavelet Transform Algorithms for Finite-Duration Discrete-Time Signals	**T20:398**