

General Index

- Abel, Niels Henrik, 108, 109
- Actual error, 24
- Affine transformation, 163
- Algebraic multiplicity, 243
- Approximation, 24
- Associated matrix norm, 226
- Asymptotic error constant, 133
- Augmented matrix, 195

- Back substitution, 206
- Banded matrix, 152
- Base, 85, 94
- Basis theorem, 193
- Binary arithmetic, 85
- Birthday problem, 70
- Bisection method, 110
- Bracket, 116

- Cantor, Georg F.L.P., 169
- Cantor square, 184
- Cardano, Girolamo, 108
- Central difference formula, 43
- Characteristic polynomial, 241
- Chopped arithmetic, 89
- Clay Foundation, 68
- Cofactor expansion, 76
- Collatz, Lothar, 77
- Collatz conjecture, 67, 68
- Column, 143
- Combinatorics: alternating power sums, 202
- Combinatorics: power sums, 202
- Component-wise operation, 9
- Computed solution, 231
- Computer graphics, 157
- Condition number, 228-230
- Convergence order, 132
- Convergence theorem, 262, 264, 266
- Counter, 60
- Cramer, Gabriel, 203
- Cramer's rule, 203
- Cycling, 122

- Determinant, 75, 222
- Degree, 25
- Diagonal matrix, 147
- Diameter, 71
- Dilation, 172
- Dimension, 171
- Direct method, 252
- Divided difference, 131
- Dot product, 22, 144
- Double root, 130

- Eigendata, 240
- Eigenspace, 243
- Eigenvalue, 240
- Eigenvector, 240
- Elementary matrix, 208
- Elementary row operation (ERO), 207
- Epicycloids, 13
- Equivalent linear system, 195
- Error bound via residual, 233
- Error function, 42
- Error term, 231
- Essentially disjoint, 172
- Euclidean length, 224
- Exact answer, 24, 231
- Expected value, 83

- False, 57
- Fern leaf fractal, 185
- First generation, 170
- Fixed point iteration, 140
- Floating point number, 85
- Flop, 74
- Flop counts (for Gaussian elimination), 226
- Fontana, Niccolo 108
- Forward substitution, 207
- Forward difference formula, 43
- Fractals (fractal sets), 169
- Future value annuities, 72, 73

- Galois, Evariste, 109
- Gauss, Carl Friedrich, 204
- Gaussian elimination, 203-213
- Gauss-Seidel iteration, 256
- Generalized minimum residual method, 273
- Geometric multiplicity, 243
- Global variables, 46
- Gosper island fractal, 185, 186

- Hilbert, David, 193
- Hilbert matrix, 192
- Homogeneous coordinates, 163, 164
- Hyper convergence of order α , 133

- Identity matrix, 148
- IEEE double precision standard, 86
- Ill-conditioned, 102
- Ill-posed, 187
- Inline function, 51
- Infinite loop, 16
- Infinity matrix norm, 227
- Infinity (vector) norm, 225
- Input-output analysis, 200, 201

- Internal demand matrix, 201
- Inverse of a matrix, 148
- Invertible (nonsingular), 148
- Iterative, 109
- Iterative method, 252
- Iterative refinement, 249
- Jacobi-Gauss Convergence Theorem, 262
- Jacobi iteration, 253
- Julia, Gaston, 169
- Leading one, 195
- Leontief, Wassily, 200
- Linear convergence, 133
- Linear transformation, 160
- Local variables, 46
- Logic, 57
- Logical operators, 58
- Lower triangular, 205
- LU decomposition (or factorization), 213
- Machin, John, 43
- Machine epsilon, 86
- Maclaurin, Colin, 39
- Maclaurin series, 38
- Mandelbrot, Benoit, 170
- Mantissa, 87
- Matrix, 143
- Matrix arithmetic, 144
- Max norm, 225
- M-file, 45
 - Function M-files, 45
 - Script M-files, 45
- Monte-Carlo method, 173
- Mother loop, 62
- Multiple root, 125
- Multiplicity 1, 55
- Nearly singular (poorly conditioned), 228
- Nested loop, 61
- Newton's method, 118, 119
- Nonsingular (invertible), 148
- Numerical differentiation, 43
- Order, 130
- Output matrix, 201
- Overflow, 88
- Parallel, 239
- Parametric equations, 11
- Partial pivoting, 211
- Path (MATLAB's), 45
- Peano, Guisepppe, 169
- Perfect number, 81
- Pivot, 211
- Polynomial, 25
- Polynomial interpolation, 189, 197-199
- Poorly conditioned matrix, 150, 228
- Positive definite matrix, 265
- Preconditioned conjugate gradient method, 273
- Preconditioning, 273
- Prime number, 81
- Prompt, 2
- Quadratic convergence, 139
- Quadrature, 51
- Quartic, 108
- Quintic, 108
- Random integer matrix generator, 152
- Random walk, 82
- Recursion formulas, 15
- Reduced row echelon form, 195
- Reflection, 162
- Relative error bound (via residual), 233
- Relaxation parameter, 258
- Remainder (Taylor's), 35
- Residual, 116
- Residual matrix, 250
- Residual vector, 232
- Rhind Mathematical Papyrus, 107
- Root, 110
- Rotation, 161
- Rounded arithmetic, 89
- Row, 143
- Scalar, 240
- Scalar multiplication, 144
- Scaling, 161
- Secant method, 128, 129
- Self-similarity property, 169
- Shearing, 181
- Shift transformation, 162
- Sierpinski, Waclaw, 170
- Sierpinski carpet fractal, 184, 185
- Sierpinski gasket fractal, 170
- Significant digits, 85
- Similarity transformation, 172
- Simple root, 125
- Simulation, 79
- SOR (successive over relaxation), 258
- SOR convergence theorem, 264
- Sparse matrix, 151, 269-278
- Special function, 289
- Spectrum, 251
- Statement, 57
- Strictly diagonally-dominant (by columns), 221
- Strictly diagonally-dominant (by rows), 264
- Submatrix, 76
- Symbolic computation, 285
- Symmetric matrix, 243
- Tartaglia, 108
- Taylor, Brook, 34
- Taylor polynomial, 25
- Taylor series, 38
- Taylor's theorem, 35
- Technology matrix, 201

General Index

331

Tessellation, 186
Thomas, Llewellyn H., 220
Thomas method, 220
Tolerance, 24
Traffic logistics, 199, 200
Transpose, 7
Tridiagonal matrix, 150
Triple root, 126
True, 57
Truth value, 57

Underflow, 88
Unit roundoff, 86
Upper triangular matrix, 204

Vandermonde matrix, 197
Variable precision arithmetic, 285
Vector, 7
Vector norm, 225
von Koch, Niels F.H., 179
von Koch snowflake, 179

Weierstrass, Karl, 179
Well-conditioned, 102
Well-posed, 187

Zero divisors, 105
Zeroth generation, 170

