List of Program Modules (by Chapter)

Chapter 1

1.7	`error`	Error handling routine

Chapter 2

2.2	`gaussElimin`	Gauss elimination
2.3	`LUdecomp`	LU decomposition
2.3	`choleski`	Choleski decomposition
2.4	`LUdecomp3`	LU decomposition of tridiagonal matrices
2.4	`LUdecomp5`	LU decomposition of pentadiagonal matrices
2.5	`swap`	Interchanges rows or columns of a matrix
2.5	`gaussPivot`	Gauss elimination with row pivoting
2.5	`LUpivot`	LU decomposition with row pivoting
2.7	`gaussSeidel`	Gauss–Seidel method with relaxation
2.7	`conjGrad`	Conjugate gradient method

Chapter 3

3.2	`newtonPoly`	Newton's method of polynomial interpolation
3.2	`neville`	Neville's method of polynomial interpolation
3.2	`rational`	Rational function interpolation
3.3	`cubicSpline`	Cubic spline interpolation
3.4	`polyFit`	Polynomial curve fitting

Chapter 4

4.2	`rootsearch`	Brackets a root of an equation
4.3	`bisection`	Method of bisection

4.4	`ridder`	Ridder's method
4.5	`newtonRaphson`	Newton–Raphson method
4.6	`newtonRaphson2`	Newton–Raphson method for systems of equations
4.7	`evalPoly`	Evaluates a polynomial and its derivatives
4.7	`polyRoots`	Laguerre's method for roots of polynomials

Chapter 6

6.2	`trapezoid`	Recursive trapezoidal rule
6.3	`romberg`	Romberg integration
6.4	`gaussNodes`	Nodes and weights for Gauss-Legendre quadrature
6.4	`gaussQuad`	Gauss–Legendre quadrature
6.5	`gaussQuad2`	Gauss–Legendre quadrature over a quadrilateral
6.5	`triangleQuad`	Gauss–Legendre quadrature over a triangle

Chapter 7

7.2	`taylor`	Taylor series method for solution of initial value problems
7.2	`printSoln`	Prints solution of initial value problem in tabular form
7.3	`run_kut4`	Fourth-order Runge–Kutta method
7.5	`run_kut5`	Adaptive (fifth-order) Runge–Kutta method
7.6	`midpoint`	Midpoint method with Richardson extrapolation
7.6	`bulStoer`	Simplified Bulirsch–Stoer method

Chapter 8

8.2	`linInterp`	Linear interpolation
8.2	`example8_1`	Shooting method example for second-order differential eqs.
8.2	`example8_3`	Shooting method example for third-order linear differential eqs.
8.2	`example8_4`	Shooting method example for fourth-order differential eqs.
8.2	`example8_5`	Shooting method example for fourth-order differential eqs.
8.3	`example8_6`	Finite difference example for second-order linear differential eqs.
8.3	`example8_7`	Finite difference example for second-order differential eqs.
8.4	`example8_8`	Finite difference example for fourth-order linear differential eqs.

Chapter 9

9.2	`jacobi`	Jacobi's method
9.2	`sortJacobi`	Sorts eigenvectors in ascending order of eigenvalues
9.2	`stdForm`	Transforms eigenvalue problem into standard form
9.3	`inversePower`	Inverse power method with eigenvalue shifting
9.3	`inversePower5`	As above for pentadiagonal matrices
9.4	`householder`	Householder reduction to tridiagonal form
9.5	`sturmSeq`	Sturm sequence for tridiagonal matrices
9.5	`gerschgorin`	Computes global bounds on eigenvalues
9.5	`lamRange`	Brackets m smallest eigenvalues of a tridiagonal matrix
9.5	`eigenvals3`	Finds m smallest eigenvalues of a tridiagonal matrix
9.5	`inversePower3`	Inverse power method for tridiagonal matrices

Chapter 10

10.2	`goldSearch`	Golden section search for the minimum of a function
10.3	`powell`	Powell's method of minimization
10.4	`downhill`	Downhill simplex method of minimization

Available on Website

`xyPlot`	Unsophisticated plotting routine
`plotPoly`	Plots data points and the fitting polynomial