

Index

- ↵ (Enter key) 2
- ∫ (integral) 163, 336
- (symbolic equal sign) 279
- (vectorize operator) 156, 229, 334
- × (vector cross product) 156, 335
- ∑ (vector sum) 156, 335
- ∑ and ∏ (summation and product) 157, 335
- ! (factorial) 150, 334
- % 121, 334, 347
- () (parentheses) 64
- + (with line break) 336
- +, -, ·, and / 151, 336
- := (definition) 22, 120
- <, >, ≤, ≥ (inequalities) 152, 336
- = (Boolean equal) 152, 336
- = (evaluating expression) 23, 122
- |·| (determinant) 155, 335
- |·| (magnitude/absolute value) 155, 335
- ∞ (infinity) 121, 347
- ≠ (not equal to) 152, 336
- √ (square root) 151, 335
- 3D Plot Format dialog box 264
- aborting calculations in progress 144
- absolute value 153, 335
- acos* function 174
- acosh* function 175
- adaptive smoothing of data 203
- addition 151, 336
- Advanced Topics
 - See* Resource Center
- Ai* and *Bi* Bessel functions 176
- Airy functions 176
- algorithms
 - See* numerical methods
- aligning
 - output tables 227
 - regions 104
 - text 78
- angle* function 173
- Animate command 146
- animation
 - compressing AVI files 146
 - creating 145
 - playback 146
 - saving 146
 - saving with worksheet 147
 - speed 146–147
- antisymmetric tensor function 177
- APPEND* function 214
- APPENDPRN* function 214
- approximations
 - Minerr* function 190
 - root of expression 187
- area
 - collapsing 109
 - deleting 112
 - inserting 109
 - locking and unlocking 109
 - naming 110
 - password protecting 109
- arg* function 177
- arguments
 - of 3D plots 253
 - of functions 128
- arrays
 - calculations by element 229
 - copying and pasting 228
 - creating 48, 218
 - defining with range variables 219
 - displaying in results 136, 226
 - exporting data from 232
 - extracting a row or column 225
 - extracting a subarray 184
 - functions for 182
 - graphical display of 231
 - importing data into 220, 223
 - nested 136, 233
 - operators for 154
 - ORIGIN used with 225
 - output tables 136
 - See also* matrices and vectors
- arrow keys, for editing 18, 351
- ASCII codes
 - entering in strings 49
 - table 353
- asin* function 174
- asinh* function 175
- assume keyword 283
- assume keyword modifier 284
- atan* function 174
- atan2* function 174
- atanh* function 175
- augment* function 184
- Auto (on status bar) 142
- automatic mode 142–143
- autoscaling of axis limits 246
- AutoSelect
 - in numerical integration 164

- in solving 192
 - overriding 165, 193
- AVI files
 - compression 146
 - creating 146
 - hyperlinking from worksheet 147
 - playback 147
- Axum component 320
- bar plots (3D)
 - arguments 254
 - creating 260
 - formatting 264
 - of function of two variables 260
 - See also* plots, 3D
- base 10 logarithm 175
- base b logarithm 175
- base of results (decimal/hex/octal/binary) 136
- base units 139
- bei* and *ber* Bessel functions 176
- Bessel functions 176
- Bessel Kelvin functions 176
- binary numbers 47, 136
- bitmaps
 - color palettes 94
 - copying from the Clipboard 92
 - creating pictures from 92
 - functions for reading 215
- blank lines, inserting or deleting 105
- blank pages in printouts 115
- blank space between regions 18
- BMP files 92, 109, 215
- bookmarks 37
- Boolean operators 152–153, 178, 191
- boundary value problems 209
- break statement 309
- breaking equations 288, 336
- bspline* function 197
- B-splines 197–198
- built-in functions
 - listed by type 172
 - symbolic only 337
- built-in variables 121
- bulleted paragraphs 78
- bvalfit* function 210
- Calc on message line 144
- calculation 23
 - controlling 142
 - disabling for individual equation 144
 - equations 23, 122, 134
 - interrupting 144
 - locking area 109–110
 - order in worksheets 122
 - restarting after interrupting 144
 - units in 138
- calculator, using Mathcad as 21
- ceil* function 178
- Celsius 133, 141
- CFFT* function 180
- cfft* function 180
- CGS units 139, 341
- characters, deleting or inserting in math 59
- Chi* function 337
- cholesky* function 186
- Ci* function 337
- Clipboard 66, 288
- CMP (colormap) files 216
- cnorm* function 196
- coeffs keyword 280–281
- Collaboratory 33, 40
- collapsing an area 111
- collect keyword 281
- colon (:) as definition symbol 22, 120
- color
 - Electronic Book annotation 35
 - equation highlight 107
 - in equations 69
 - in text 77
- color images
 - displaying 91
 - reading 215
- color palettes for bitmaps 94
- colormap files 216, 267
- cols* function 182
- column vectors
 - See* vectors
- combin* function 178
- combinatorics functions 178
- common logarithm 175
- complementary error function 179
- complex conjugate 153, 334
- complex keyword 280–281
- complex numbers
 - conjugate 153
 - determining angle 153
 - display of 136
 - entering 47
 - imaginary unit symbol 136
 - magnitude of 153
 - operators and functions for 153, 178
 - real and imaginary parts 153
 - vector field plots 262
- complex threshold 136

- Component Wizard 318
- components
 - inserting 318
 - overview of 317
- computing results 23, 122, 128
- concat* function 213
- cond2* function 183
- conde* and *condi* functions 183
- condition number of matrix 183
- conditional
 - functions 177, 213
 - statement 304
- conjugate (complex) 153, 334
- constants
 - See* numbers *and* predefined variables
- Constants math style 68
- constraint
 - in solve blocks 191
 - tolerance 192
- context menu
 - See* pop-up menu
- continue statement 309
- contour integrals 166
- contour plots
 - creating 258
 - formatting 264
 - of function of two variables 259
 - See also* plots, 3D
- convert keyword 282, 287
- Convert to Partial Fraction command 287
- converting to partial fractions 282
- copy and paste 19, 95, 142
- copying
 - expressions 66
 - from Electronic Book 36
 - regions 19
 - results 142
- corr* function 193
- cos* function 174
- cosh* function 175
- cosine (*cos*) function 212
- cosine integral 337
- cot* function 174
- coth* function 175
- covariance 193
- creating
 - 2D plots 236
 - 3D plots 252
 - contour plots 258
 - hyperlinks 112
 - pop-up window 112
 - surface plots 256
 - text regions 72
 - vector field plots 262
 - worksheet templates 100
- cross product 156, 335
- crosshair for insertion 19
- csc* function 174
- csch* function 175
- csign* function 177
- csort* function 187
- CTOL variable 192, 347
- cube root 137, 335
- cubic spline interpolation 196
- cumulative distribution functions 194
- curve fitting
 - functions for 199
 - polynomial 200
 - using cubic splines 196
- curves, finding area under 163
- cvar* function 193
- δ function 177
- d/dx
 - See* derivatives
- dashed selection rectangle 19
- data
 - entering into a table 222
 - graphing 244
- data files
 - functions for reading and writing 214
 - reading data from 220
 - reading into a matrix 220
 - writing from an array 232
- data input 223
- date in header or footer 109
- dbeta* function 195
- dbinom* function 195
- dcauchy* function 195
- dchisq* function 195
- decimal places
 - See* precision
- decimal points
 - numerical calculation 135
 - symbolic calculation 280
- decomposition
 - matrix 186
 - partial fraction 280
 - singular value 186
- default formats
 - 2D plots 246
 - 3D plots 264
 - numerical results 134

- template 100
- worksheet layout 100
- defining
 - complex numbers 47
 - functions 128
 - global variables 123
 - local variables in program 302
 - multiple definitions of variable 123
 - numbers 46
 - operators 167
 - programs 302
 - range variables 125
 - recursive functions 314
 - strings 49
 - units 133, 139
 - variables 22, 120
 - See also* creating
- definite integral 291
- definition symbol ($:=$) 22, 120
- degrees, converting to radians 141, 174
- deleting
 - blank lines 105
 - characters in math 59
 - equations 20
 - hard page breaks 108
 - hyperlinks 114
 - operators 62
 - parentheses 65
 - parts of an expression 67
 - regions 20
 - text 72
- delta function 177, 337
- derivatives 160, 336
 - higher order 162
 - symbolic 290
- determinant 155, 296, 335
- device-independent bitmap 92
- dexp* function 195
- dF* function 195
- dgamma* function 195
- dgeom* function 195
- dhypergeom* function 195
- diagonal matrix (*diag*) function 182
- DIB
 - See* device-independent bitmap
- dictionaries (spell-checker) 84
- differential equations 203
 - higher order 205
 - partial 211
 - second order 205
 - slowly varying solutions 207
 - smooth systems 207
 - stiff systems 207
 - systems 206
- differentiation
 - See* derivatives
- differentiation variable 160, 162
- digamma* function 338
- dilog* function 337
- dilogarithmic integral 337
- dimensions 133
- Dirac* delta function 337
- disabling equations 82, 144
- Display as Matrix style 136
- displayed precision 135
- distribution functions 194
- division 151, 335
- dlnorm* function 195
- dlogis* function 196
- dnbinom* function 196
- dnorm* function 196
- dot product 155
- double integrals 167
- Down One Level command 136, 234
- dpois* function 196
- drag and drop 19, 36, 66, 95, 97, 142, 273
- dragging regions 19
- drawings
 - See* pictures
- dt* function 196
- dunif* function 196
- dweibull* function 196
- ϵ function 177
- e*, base of natural logarithms 121, 347
- Edit Go to Page command 18
- Edit Links command 98
- editing equations
 - annotated example 57
 - applying an operator 58
 - changing a number 59
 - changing a variable or function name 59
 - compared to word processors 57
 - deleting an operator 62
 - deleting parentheses 65
 - deleting parts of expression 67
 - inserting an operator 59
 - making expression an argument to a function 65
 - moving parts of an expression 66
 - moving/rearranging equations 104
- editing lines 22, 26, 57
- Ei* function 337
- eigenvalues 184–185

- eigenvectors 184–185
- Electronic Book
 - browsing history 34
 - copying information from 36
 - moving around in 34, 37
 - searching for information in 34
 - toolbar 34, 37
- Electronic Books 31, 112, 114
- Email 40, 116
- endpoints for ranges 127
- Enter key 2
- epsilon function 177
- equal sign (=)
 - as Boolean operator 336
 - in numerical calculations 122
 - in solve blocks 189
 - symbolic calculations 279, 293–294
- equality constraints 191
- equations
 - as constraints in solve blocks 191
 - breaking 288, 336
 - calculating results 23, 122
 - color 69
 - disabling calculation for 82, 144
 - dragging and dropping 66
 - effect of range variables in 126
 - errors in 147
 - font 67
 - global definitions 123
 - in text 81
 - locking in area 109–110
 - order of evaluation 122, 142
 - processing and calculating 23, 142
 - properties 82, 144
 - solving for root 187
 - solving symbolically 293–295
 - solving with solve blocks 189
 - styles 67
 - units in 131
 - variable definition 120
 - wrapping 336
- erf* function 178, 337
- erfc* function 179
- ERR variable and *Minerr* 192
- error (*erf*) function 178–179, 337
- error messages
 - correcting 148
 - custom 213
 - in equations 147
 - in programs 312
 - with units 133
- error* string function 213, 312
- Euler’s constant 337
- Evaluate Complex command 287
- Evaluate Floating Point command 280, 287
- Evaluate in Place option 288
- Evaluate Symbolically command 287–288
- Excel component 324
- exiting Mathcad 30
- exp* function 175
- Expand command 287
- expand in series 282
- expand keyword 280–281, 287
- expand nested arrays 136
- Expand to Series command 280
- Expert Solver 12, 189, 193
- exponent 151, 335
- exponential
 - function 175
 - integral 337
 - notation, entering 47
 - notation, in displayed results 136
 - threshold 136
- exporting
 - worksheets as HTML 102
 - worksheets as RTF 101
- expressions
 - applying a function to 65
 - converting to partial fractions 287
 - correcting errors in 148
 - deleting parts of 67
 - error messages in 147
 - evaluating 122
 - expanding 280, 287
 - factoring 280
 - finding the coefficients of 280
 - moving parts of 66
 - selecting several 104
 - simplifying 287
 - symbolic evaluation of 279–280
- Extension Packs 9, 172
- F (function) keys, table of 350
- Φ function 177
- Factor command 287
- factor keyword 280–281
- factorial (!) 151, 334
- Fahrenheit 133, 141
- fast Fourier transform 180
- FFT* function 180
- fft* function 180
- fhyper* function 179
- file access functions 214

File Read/Write component 220, 232
 File Send command 116
 files
 opening 100
 reading data from 214, 220
 saving 30
 writing data to 214
 filters
 for exporting data 232
 for importing data 220
Find function 190, 295
 first order differential equation 203
 float keyword 280–281
floor function 178
 font
 changing in header or footer 109
 changing in math 67
 changing in text 76
 footers 108
 for loop 306
 Format Header/Footer command 108
 Format Properties command 82
 Format Style command 79
 format units in results 136
 formatting
 2D plots 245
 3D plots 264
 numbers in matrices 228
 results 134
 symbolic 288
 worksheets 107
 Formatting toolbar 17
 math styles 69
 text styles 79
 fourier keyword 280, 282, 297
 Fourier transforms
 numeric functions 180
 symbolic 280, 282, 297
 FRAME for animation 145
 Fresnel cosine integral 337
 Fresnel sine integral 337
 FTP 39
 functions
 applying to an expression 65
 built-in 172
 colormap 216, 267
 combinatorics 178
 complex arithmetic 153
 defining 26, 128
 error message 213
 file access 214
 Fourier transform 180
 hyperbolic 175
 inserting 172
 interpolation 196
 inverse trigonometric 174
 log and exponential 175
 matrix decomposition 186
 number theory 178
 optimization 187
 piecewise continuous 177, 213, 305
 plotting as 3D plot 256, 259–260
 population statistics 193
 prediction 196
 probability distribution 194
 recursive 130, 314
 regression 199
 smoothing 202
 solving 187
 special 178
 statistical 193
 string manipulation 213
 symbolic calculation 337
 tensor 177, 213
 that take vector arguments 182
 to combine arrays 184
 to compute angle to a point 177
 to create arrays 184
 to find roots of expressions 187
 to manipulate strings 213
 trigonometric 173
 user-defined 50, 128
 vector and matrix 182
 See also built-in functions
 gamma (Euler’s constant) 337
 gamma function 179
 Gaussian distribution 196
 gcd function 178
 generalized
 eigenvalues 185
 eigenvectors 185
 inverse of a matrix 182
 regression 201
 genfit function 201
 geninv function 182
 genvals function 185
 Given, in solve blocks 189, 295
 global definitions 123–124
 gmean function 193
 Gopher 39
 graphing
 data 241

- expressions 240
- functions 240
- vector 241
- graphs
 - Axum 320
 - creating 27, 86
 - formatting 29, 89
 - resizing 28
 - S-PLUS 321
 - See also* plots, 2D and plots, 3D
- greatest integer function 178
- Greek letters
 - in equations 51
 - in text 74
 - table of 349
- Greek toolbar 52, 74, 349
- guess
 - for root finding 187
 - for solve blocks 189
- hard page breaks 108
- HBK files 32
- headers and footers 108
- heaviside step function 177
- Help
 - context-sensitive 37
 - on-line 37
 - See also* Resource Center and technical support
- Her* function 179
- hexadecimal numbers 47, 136
- highlighting equations 106
- hist* function 193
- histograms 193
- history of browsing in Electronic Book 34
- hmean* function 193
- HTML 36, 102
- HTTP 39
- hyperbolic cosine integral 337
- hyperbolic functions 175
- hyperbolic sine integral 338
- hyperlinks
 - and relative paths 113
 - deleting 114
 - editing 114
 - to other file types 114
 - to worksheets 112
- Hypertext Mark-up Language
 - See* HTML
- i* (imaginary unit) 47
- I₀*, *I₁*, and *I_n* Bessel functions 176
- ibeta* function 179
- ICFFT* function 180
- icfft* function 180
- identity* function 182
- identity matrix 182
- if* function 177, 213
- if statement 304
- ifft* and *icfft* functions 180
- IFFT* function 180
- Im* function 177
- image file
 - BMP format 92, 215
 - in headers and footers 109
- imaginary numbers
 - choosing *i* or *j* for display 136
 - entering 47
 - symbol for 47, 136
- imaginary value 136
- implied multiplication 56, 132, 348
- impulse function 177
- incompatible units (error message) 133
- increments for ranges 127
- indefinite integral 291
- indented paragraphs 78
- index variables
 - See* range variables
- inequalities 152, 336
 - as constraints in solve blocks 191
- infinity (∞) 51, 121, 347
- inner product 155
- in-place activation 95, 319
- Input Table component 222–223
- input to a component 318
- Insert Area command 110
- Insert Function command 172
- Insert Hyperlink command 112
- Insert key 59, 72
- Insert Link command 112
- Insert Math Region command 81
- Insert Matrix command
 - to create array 48, 218
 - to resize array 219
- Insert Object command 19, 95, 142
- Insert Reference command 112, 316
- Insert Unit command 132, 138
- inserting
 - blank lines 105
 - characters 59
 - equations in text 81
 - functions 65
 - hyperlinks 112
 - math region 81
 - minus sign in front of expression 63

- parentheses around expression 64
 - text 72
 - units 132
 - worksheet 316
- insertion point 21
- integral transforms
 - Fourier 280, 297
 - Laplace 280, 297
 - z 280, 297
- integrals 163, 336
 - algorithms 164
 - AutoSelect 164
 - contour 166
 - double 167
 - indefinite 291
 - symbolic evaluation of 291
 - tolerance 166
 - variable limits 165
- integration
 - adaptive 164
 - improper endpoints 164
 - infinite limits 164
 - Romberg 164
- IntelliMath 8
- IntelliMouse support 18, 275
- intercept* function 199
- International System of units (SI) 139
- Internet
 - access 39
 - Collaboratory 40
 - Web browsing 36
- Internet Explorer
 - See* Microsoft Internet Explorer
- Internet setup 39
- interp* function 197
- interpolation
 - cubic spline 196
 - functions 196
 - linear 196
- interrupting calculations in progress 144
- inverse
 - cumulative distributions 194
 - Fourier transform 280, 282, 297
 - hyperbolic functions 175
 - Laplace transform 280, 282, 297
 - matrix 155, 335
 - trigonometric functions 174
 - wavelet transform 181
 - z -transform 280, 283, 297
- invfourier keyword 280, 282, 297
- invlaplace keyword 280, 282, 297
- invztrans keyword 280, 283, 297
- IsArray* function 212
- IsScalar* function 212
- IsString* function 212
- iterated product 157, 335
- iterated sum 157
- iteration
 - in programs 306
 - with range variables 25
- iwave* function 181
- j (imaginary unit) 47
- J_0 , J_1 , and J_n Bessel functions 176
- Jac* function 179
- Jacobian matrix 208
- JavaScript 328
- js and ys spherical Bessel functions 176
- JScript 328
- K_0 , K_1 , and K_n Bessel functions 176
- keywords, symbolic 280–283
- Kronecker’s delta function 177
- ksmooth* function 203
- kurt* function 193
- Lag* function 179
- Lambert’s W function 338
- laplace keyword 280, 282, 297
- Laplace transforms 280, 282, 297
- Laplace’s equation 211
- last* function 182
- Laurent series 280
- least integer function 178
- left inverse of a matrix 182
- Leg* function 179
- length* function 182
- limits, evaluating 151, 292
- line break
 - in equation 336
 - in text 73
- linear
 - interpolation 196
 - prediction 196
 - programming 189
 - regression 199
 - system solver and optimizer 189
 - systems of differential equations 206
 - systems of equations 186, 189
- linfit* function 201
- link
 - to objects 95
 - to other worksheets 112, 316
 - See also* hyperlinks
- linterp* function 196–197

- literal subscripts 52
- ln* (natural log) function 175
- LoadColormap* function 216, 267
- local result format 26, 134
- lockable area
 - See* area
- locked calculations 109–111
- locking and unlocking an area 109
- loess* function 200
- log* function 175
- logarithms and exponential functions 175
- logical operators
 - See* Boolean operators
- looping
 - for loop 306
 - while loop 307
- lsolve* function 186
- lspline* function 197
- lu* function 186
- Macintosh Mathcad 6 files 102
- magnitude
 - complex numbers 153, 335
 - vector 155
- mailing worksheets 116
- manual mode 143
- margins 107
- Math Optimization command 300
- Math Options command 121
- math styles
 - applying 69
 - Constants 68
 - editing 68
 - saving 70
 - Variables 68
- Math toolbar 16, 52
- Mathcad 6 for Macintosh 102
- Mathcad 6 for Windows 102
- Mathcad 7 for Windows 102
- Mathcad Document object model 330
- Mathcad in Action
 - See* Resource Center
- Mathcad OLE automation objects 330
- Mathcad Overview
 - See* Resource Center
- Mathcad Web Library
 - See* Resource Center
- MathConnex 327
- MathSoft home page 36
- MATLAB component 326
- matrices
 - adding/deleting rows or columns 219
 - as array elements 233
 - calculations by element 229
 - combining 184
 - condition number 183
 - creating 48
 - creating from bitmaps 215
 - creating with components 318
 - decomposition functions 186
 - defining by formula 219
 - defining with two range variables 219
 - definition of 48, 218
 - determinant 155, 296, 335
 - displayed as pictures 91
 - displayed as scrolling output tables 226
 - extracting a column 223
 - extracting a submatrix 184
 - extracting elements 223
 - functions for 182
 - inverting 155, 335
 - limits on size 218, 227
 - matrix arithmetic 155
 - norm 183
 - norm of 183
 - numbering elements 225
 - operators for 154
 - ORIGIN used with 225
 - plotting in 3D bar chart 260
 - plotting in contour plot 258
 - plotting in surface plot 256
 - plotting in vector field plot 263
 - raising to a power 335
 - rank 183
 - singular values 186
 - sorting by row or column 187
 - special characteristics 183
 - start with row and column zero 225
 - subscripts 224
 - trace 183
 - transpose 155, 334
 - See also* arrays
- Matrix Determinant command 296
- matrix display style 136
- matrix* function 184
- Matrix Invert command 296
- matrix subscript 334
- Matrix Transpose command 296
- max* function 182
- Maximize* function 190
- MCD file 100
- MCT file 100
- mean

- arithmetic 193
- geometric 193
- harmonic 193
- mean* function 193
- median* function 193
- messages
 - removing from the Collaboratory 42
 - sending to the Collaboratory 42
- metafile 92
- mhyper* function 179
- Microsoft Internet Explorer 33, 36, 328
- Microsoft Office 11, 97, 324
- min* function 182
- Minerr* function 190, 192
- Minimize* function 190
- minus sign
 - for negation 151, 335
 - inserting in front of expression 63
- MKS units 139, 345
- mod* function 178
- mode
 - See* automatic mode, manual mode
- mode* function 194
- moving
 - crosshair 19, 351
 - editing lines 58, 351
 - insertion point 58, 351
 - regions 19
- multigrid* function 212
- multiple integrals 167
- multiple roots
 - finding with *polyroots* 188
 - finding with solve blocks 192
- multiple summations 158
- multiplication 56, 335
 - implied 56, 132, 348
- multivalued functions 138
- names of variables and functions 50
- natural logarithm 175
- negating an expression 63, 335
- nested arrays
 - defining 233
 - displaying 233
 - expanding 136, 234
 - for 3D plot arguments 254
- new features in Mathcad 8 11
- nonlinear systems of equations 189
- nonscalar value (error message) 126
- norm
 - of matrix 183
 - of vector 155, 335
- norm1* and *norm2* functions 183
- normal distribution 196
- norme* and *normi* functions 183
- not converging (error) 166
- notation in this *User's Guide* 1
- n*th order derivative 162
- n*th root 151, 335
- num2str* function 213
- number theory functions 178
- numbered paragraphs 78
- numbers 46
 - binary 47, 136
 - complex 47
 - decimal 136
 - displayed as zero 136
 - exponential notation for 47, 136
 - format for computed results 134
 - formatting 26, 134
 - hexadecimal 47, 136
 - imaginary 47
 - octal 47, 136
 - radix (base) for results 136
 - rounding 178
- numerical methods
 - differentiation 160, 162
 - integration 163
 - root finding 188
 - solving and optimization 192
- object linking and embedding
 - See* OLE
- object model, Mathcad Document 330
- objects
 - embedding 95
 - linking 95
- octal numbers 47, 136
- OLE
 - automation 327, 330
 - drag and drop 97
 - editing links 98
 - in-place activation 95, 97, 319
 - scripting objects 328
 - via components 317
- on error statement 311
- on-line resources 31
- OpenGL 252
- opening worksheets 101
- operators
 - Boolean 152
 - customizing 167
 - defined 53
 - derivative 160, 290

- for complex numbers 153
- for vectors and matrices 154
- indefinite integral 291
- inserting 59
- integral 163
- iterated product 157
- iterated sum 157
- logical 152, 178
- n th order derivative 162
- programming 151
- symbolic 151
- table of 334
- toolbars 16, 150
- vector sum 159
- Optimize Palette command 94
- optimizers 189
- order
 - of derivative 163
 - of differential equations 203
 - of polynomial regression 200
 - of worksheet evaluation 124
- ORIGIN variable 121, 225
- output from a component 318
- output table 226
 - alignment 227
 - resizing 227
 - versus matrix display style 136
- overlapping regions 105
- overtyping text 72
- overview of Mathcad features 7, 33
- page
 - breaks, inserting and deleting 108
 - headers and footers 108
 - length 108
 - numbering 109
- Page Setup dialog box 107, 115
- palettes, color, for bitmaps 94
- paragraphs 72
 - bullets 78
 - hanging indent 78
 - indenting 78
 - numbers 78
 - properties 77
 - text alignment in 78
- parametric surface plots
 - creating 257
 - See also* plots, 3D
- parentheses
 - deleting from expression 65
 - inserting into an expression 64
- partial differential equations 211
- partial fractions 280
- password protecting an area 109
- Paste command 20, 96
- Paste Special command 20, 93, 96
- pasting
 - bitmaps 92
 - device-independent bitmaps 92
 - from Clipboard 66, 92
 - metafiles 92
 - OLE objects 20, 96
- pbeta* function 195
- pbinom* function 195
- pcauchy* function 195
- pchisq* function 195
- Pearson's correlation coefficient 193
- pending computations 142–144
- percent 121, 347
- permut* function 178
- permutations 177
- personal
 - dictionary (spell-checker) 84
 - QuickSheets 169
- pF* function 195
- pgamma* function 195
- pgeom* function 195
- phypergeom* function 195
- pi (Π , product symbol) 157
- pi (3.14159...) 58, 121, 347, 349
- picture operator 91, 232
- pictures
 - border on 93
 - creating from bitmap file 92
 - creating from matrix 91
 - formatting 93
 - importing into an array 215
 - pasted from Clipboard 92
 - resizing 93
- piecewise continuous functions 177, 305
- placeholder 21, 46
- Playback command 147
- plnorm* function 195
- plogis* function 196
- plots, 2D 86
 - autoscaling of axis limits 246
 - changing perspective 247
 - copying format from existing plot 246
 - default formats 246–247
 - formatting 245
 - graphing expressions 238
 - graphing functions 238
 - graphing vectors 242

- multiple traces on 239
- of data 244
- QuickPlot 28
- read-out of coordinates 249
- reference lines in 246
- resizing 28
- setting axis or data limits 246
- setting default formats 247
- Show Markers 246
- titles and labels 245
- traces on 239
- tracing coordinates on 249
- zooming 247–248
- plots, 3D 87, 251
 - 3D bar plots 260
 - 3D Plot Format dialog box 265
 - 3D Plot Wizard 253
 - 3D scatter plots 261
 - annotations 273
 - arguments 253
 - backplanes 265
 - changing perspective 274
 - color 266, 271
 - colormaps 267–268
 - contour lines 269
 - contour plots 258
 - examples 255
 - fill color 266
 - filling contours 268
 - fog 264
 - formatting 264
 - graphic annotations on 273
 - interconverting 272
 - lighting 271
 - line color 270
 - lines 268
 - multiple plots on 254
 - OpenGL graphics engine 252
 - parametric surface plots 257
 - point color 271
 - point symbols 270
 - resizing 28
 - rotating 274
 - spinning 275
 - surface plots 256
 - text on 273
 - titles 266
 - vector field plots 262
 - wireframe 268
 - zooming 275
- pnorm* function 196
- Poisson's equation 211
- polar plots
 - creating 237
 - formatting 245
 - See also* plots, 2D
- polygamma* function 338
- polynomial
 - finding the roots of 188
 - regression 200
- Polynomial Coefficients command 280
- polyroots* function 187–188
- population standard deviation 194
- population statistics 193
- population variance 194
- pop-up menu
 - 3D plots 274
 - animation playback 147
 - component 319
 - Excel component 325
 - Input Table component 223
 - integration 165
 - MATLAB component 326
 - output table 136
 - Scriptable Object component 329
 - solving 193
 - S-PLUS Graph component 321
 - S-PLUS Script component 323
 - Web browsing 37
- pop-up window, creating 112
- power 151, 335
- ppois* function 196
- precision
 - in displayed results 135
 - internal 135
- predefined variables 121
- predict* function 197
- prediction, linear 196
- principal branch of function 138
- Print Preview command 115
- printing 30, 114
 - and calculation of worksheet 144
 - and pagination 108
 - blank pages in 107, 115
 - color 107
 - print preview 115
 - wide worksheets 115
- PRNCOLWIDTH variable 121, 347
- PRNPRECISION variable 121, 347
- probability distributions 194
- processing equations 23, 142, 144
 - results of 142

- product 157, 335
 - cross product 156
 - dot product 155
 - iterated 157
- programs 301
 - adding lines 302
 - break statement 309
 - continue statement 309
 - controlling or interrupting 308
 - defining 302
 - error handling 310
 - error messages in 312
 - for loop 306
 - generating symbolic results 303
 - if statement 304
 - local assignment 302
 - looping 306
 - nested 312
 - on error statement 311
 - output of 302
 - recursion 314
 - return statement 309
 - statements 302
 - subroutines 312–313
 - symbolic evaluation of 303
 - while loop 307
- properties
 - of components 319
 - region 106
- proxy server 39
- Psi* functions 338
- pspline* function 197
- pt* function 196
- punif* function 196
- pweibull* function 196
- qbeta* function 195
- qbinom* function 195
- qcauchy* function 195
- qchisq* function 195
- qF* function 195
- qgamma* function 195
- qgeom* function 195
- qhypergeom* function 195
- qlnorm* function 195
- qlogis* function 196
- qnorm* function 196
- qpois* function 196
- qr* function 186
- qt* function 196
- QuickPlot 28, 86, 236, 238
- QuickSheets 32
 - storing custom operators 169
 - See also* Resource Center
- qunif* function 196
- qweibull* function 196
- radians
 - converting to degrees 141, 174
 - trig functions 174
- radix of displayed results 136
- range variables
 - array calculations with 229
 - creating arrays with 219
 - defining 25, 125, 127
 - fundamental principle for 126
 - how Mathcad evaluates equations with 126
 - setting endpoints and increments 127
- rank* function 183
- rbeta* function 195
- rbinom* function 195
- rcauchy* function 195
- rchisq* function 195
- Re* function 177
- READ_BLUE* function 215
- READ_GREEN* function 215
- READ_HLS* function 215
- READ_HLS_HUE* function 215
- READ_HLS_LIGHT* function 215
- READ_HLS_SAT* function 215
- READ_HSV* function 215
- READ_HSV_HUE* function 215
- READ_HSV_SAT* function 215
- READ_HSV_VALUE* function 215
- READ_IMAGE* function 215
- READ_RED* function 215
- READBMP* function 215
- READPRN* function 214
- READRGB* function 215
- recursion 130, 314
- reduced-row echelon form 182
- Reference Tables
 - See* Resource Center
- references
 - and relative paths 317
 - to other worksheets 316
- regions 18
 - aligning 104
 - blank space between 19
 - copying 19
 - deleting 20
 - dragging 19
 - dragging across documents 20
 - equation 18

- locking 109
- moving 19
- overlapping 105
- selecting 22
- separating 105
- text 72
- unlocking 111
- viewing 18, 105
- regress* function 200
- regression
 - functions 199
 - generalized 201
 - linear 199
 - localized 200
 - multivariate 200
 - polynomial 200
 - using linear combinations of functions 201
- relational operators 178
- relative paths
 - for hyperlinks 113
 - for references 317
- relax* function 212
- Repaginate Now command 108
- replacing characters in math or text 83
- resizing
 - graphs 28, 88
 - pictures 93
- Resource Center 32
 - accessing worksheets on Web 36
 - Advanced Topics 33
 - bookmarks 37
 - Getting Started 33
 - Mathcad in Action 33
 - Mathcad Overview 33
 - Mathcad Web Library 33
 - QuickSheets 33
 - Reference Tables 33
 - Web browsing in 36
- resources, on-line 31
- result format 134
 - global 137
 - local 134
- results
 - calculating 23
 - calculating with equations 122, 134
 - complex 137
 - copying 142
 - formatting 134
 - units and dimensions in 138
- return statement 309
- reverse* function 187
- rF* function 195
- rgamma* function 195
- rgeom* function 195
- rhypergeom* function 195
- rich text format (RTF) 101
- right page margin 107
- rkfixed* function 203
- rnorm* function 195
- rlogis* function 196
- rnd* function 196
- rnorm* function 196
- root* function 187
- roots
 - finding 187
 - finding multiple with solve blocks 192
 - finding symbolically 293
 - numerical approximations used 188
 - of polynomials 188
- round* function 178
- rounding numbers 178
- row vectors
 - See* vectors
- rows* function 182
- rpois* function 196
- rref* function 182
- rsort* function 187
- rt* function 196
- RTF file 100
 - See also* rich text format
- runif* function 196
- rweibull* function 196
- sample standard deviation 194
- sample variance 194
- Save As dialog box 30
- SaveColormap* function 216, 267
- saving
 - new file 30
 - templates 103
 - worksheets 30, 100
- sbval* function 209
- scalar
 - addition 155
 - definition of 48, 218
 - division 155
 - multiplication 155
- scatter plots (3D)
 - arguments for 254
 - creating 261
 - formatting 264
 - See also* plots, 3D
- Scriptable Object component 327

- object model 329
- search
 - Electronic Book 35
 - in equations 82
 - in text 82
- Search Book command 34
- search* function 213
- sec* function 174
- sech* function 175
- second derivatives, calculating 162
- second order differential equations 205
- selecting
 - graphs 28
 - math expression 60
 - page break 108
 - regions 19, 22
 - text 73
- selection rectangle 19
- semicolon, in range variable definitions 125
- Separate Regions command 106, 108
- separating overlapping regions 105, 108
- series 280
- series keyword 282
- Shi* function 338
- Show Border option 94
- Si* function 338
- sigma (summation symbol) 157
 - for vector 156
- sign* function 177
- signum* function 177
- Simplify command 287
- simplify keyword 281, 287
- simultaneous equations, solving numerically 186, 189
- sin* function 174
- sine integral 338
- singular value decomposition 186
- sinh* function 175
- skew* function 194
- slope* function (linear regression) 199
- smooth systems (differential equations) 207
- smoothing of data 202
- soft page breaks 108
- solve blocks 189
 - constraints in 191
 - definition of 189
 - expressions allowed in 191
 - finding multiple solutions 192
 - Given* in 189
 - tolerance 192
 - using to solve symbolically 295
 - values returned by 190
- solve keyword 281, 293–294
- solving equations 189
 - AutoSelect of algorithm 192
 - differential equations 204
 - linear systems 192
 - nonlinear systems 192
 - with *lsolve* 186
 - with *root* function 187
 - with solve blocks 189, 295
 - with Solve for Variable 293
 - with solve keyword 293
 - See also* solve blocks
- sort* function 187
- sorting vectors and matrices 187
- spaces, inserting or deleting 105
- special functions 178
- spell-checking 83
- spline functions 196, 198
- S-PLUS Graph component 321
- S-PLUS Script component 322
- spreadsheets, exchanging data with 317
- square root 335
- stack* function 184
- stack overflow error 130
- standard deviation of a data set 194
- standard normal distribution 196
- starting Mathcad 16
- statistics
 - cubic spline interpolation 196
 - cumulative distribution functions 194
 - functions 193
 - generalized linear regression 201
 - interpolation 196
 - inverse cumulative distributions 194
 - linear interpolation 196
 - linear prediction 196
 - linear regression 199
 - multivariate polynomial regression 200
 - polynomial regression 200
 - probability density functions 194
- stderr* function 199
- Stdev* and *stdev* functions 194
- step function 177
- step size
 - for differential equation solving 207
 - for iteration 127
- str2num* function 213
- str2vec* function 213
- strings
 - arguments to file access functions 214
 - as elements of vectors 49

- comparing 153
- converting to numbers and vectors 213
- defining 49
- editing 62
- evaluating 49
- manipulating 213
- variables 49
- strlen* function 213
- styles
 - math 67
 - text 78
- submatrix* function 184
- subroutines 312–313
- subscripts
 - in text 77
 - last element function 182
 - literal 52
 - non-numeric 52
 - ORIGIN used with 225
 - start with zero 225
 - vector and matrix 334
- Substitute for Variable command 280
- substitute keyword 280, 282
- substr* function 213
- subtraction 151, 336
- summation 335
 - iterated 157
 - multiple 158
 - of vector elements 156
 - variable upper limit 159
- superscript
 - array 156, 334
 - to get column from matrix 225
- supsmooth* function 203
- surface plots
 - arguments for 253
 - creating 256
 - formatting 264
 - of function of two variables 256
 - parametric 257–258
 - See also* plots, 3D
- svd* function 186
- svds* function 186
- symbolic
 - equal sign 279
 - evaluation 279
 - evaluation of programs 303
 - evaluation returns long answers 288
 - keywords 280
 - transforms 280
- Symbolics menu commands 287
- tan* function 174
- tanh* function 175
- Taylor series 280
- Tcheb* function 179
- technical support 13
- temperature conversions 133, 141
- templates 100
 - creating new 103
 - modifying 103
 - used to save calculation mode 143
 - using to create a worksheet 100
- text 71
 - alignment 78
 - bullets in 78
 - changing font 76
 - color 77
 - editing 76
 - entering 24
 - Greek letters in 74
 - inserting equations in 81
 - moving 75
 - moving insertion point in 73
 - Occupy Page Width option 75
 - Push Regions Down As You Type option 77
 - regions 72
 - selecting 73
 - spell-checking 83
 - styles 78
- text box 24, 72
- text regions 72
 - changing width 75
 - creating 24, 72
 - editing 76
 - how to exit 24, 72
- text styles 78
 - applying 79
 - creating 80
 - modifying 79
- tilde (~), used in global definitions 123
- time in header or footer 109
- Tip of the Day 39
- TOL variable 121, 347
 - and integrals 166
 - and solve blocks 192
- tolerance
 - See* TOL variable *and* CTOL variable
- toolbars 16–17, 150
 - customizing 17
 - Electronic Book 34, 37
 - operator 150
 - programming 302

- Web 36
- top-to-bottom evaluation 122
- tr* function 183
- traces, on 2D plots 239
- trailing zeros 135
- transcendental functions 173
- transforms
 - discrete Fourier 180
 - Fourier (symbolic) 280, 297
 - Laplace 280, 297
 - symbolic 280
 - wavelet 181
 - z 280, 297
- transpose of matrix 155, 296, 334
- trig keyword modifier 284
- trigonometric functions 173
 - with degrees and radians 141
- trunc* function 178
- truncation functions 178
- two-point boundary value problems 209
- typing over text 72
- U.S. Customary units 139
- Ucheb* function 179
- undefined variables 123–124
- Uniform Resource Locator
 - See* URL
- unit impulse function 177
- unit step function 177
- units
 - alternative definitions 139
 - base units 139
 - CGS system 139
 - common sources of error 133
 - converting calculated results 140
 - default 131
 - defining 133, 139
 - dimensional consistency 133
 - errors in dimensions 133
 - formatting 136
 - in calculated values 138
 - in equations 131
 - metric 139
 - MKS system 139
 - placeholder 138
 - prefixes 140
 - SI 139
 - simplifying 136
 - U.S. customary 139
- until* function 177
- Up One Level command 234
- update
 - window manually 143
 - worksheet 144
 - worksheet window 144
- URL
 - Collaboratory 40
 - MathSoft home page 36
- Use Default Palette command 94
- user-defined functions 128
 - evaluating variables in 129
 - valid names 50
- Var* and *var* functions 194
- Variable Differentiate command 290
- Variable Integrate command 291
- Variable Solve command 294
- Variable Substitute command 287
- variables
 - defining 22, 120
 - global definitions of 123
 - in red 124, 148
 - matrices 48, 218
 - names 50
 - predefined 121
 - range variables 25, 125
 - string 49
 - substituting for 280
 - undefined 148
 - vectors 48, 218
- variance of a data set 194
- VBScript 328
- vec2str* function 213
- vector field plots
 - arguments for 254
 - creating 262
 - from complex matrices 262
 - from real matrices 264
 - See also* plots, 3D
- vector product 335
- vector subscript 334
- vector sum operator 159
- vectorize operator 229–230, 334
 - effect of 230
 - how to type 229
 - properties of 230
- vectors
 - as array elements 233
 - calculations by element 229
 - column vectors 156
 - combining 184
 - creating 48, 218
 - cross product 156
 - displayed as scrolling output tables 226

- dot product 155
- functions for 182
- graphing 242
- limit on size 218
- magnitude 155, 335
- numbering elements 225
- operators for 154
- ORIGIN used with 225
- row 156
- sorting elements 187
- start with element zero 225
- subscripts 224
- sum elements of 156, 335
- undefined elements filled with zeros 225
- vector arithmetic 155
- vectorize operator 229
- See also* arrays
- View Animate command 146
- View Zoom command 18
- Visual Basic Scripting Edition 328
- W function 338
- wait message 143
- wave function 181
- wavelet transforms 181
- Web
 - See* World Wide Web
- Web toolbar 36
- while loops 307
- windows
 - update results manually 143
 - working with 18
 - zooming in and out of 18
- Windows keystrokes 18, 350
- wireframe, in 3D plots 256, 268
- Wizards
 - for inserting 3D plots 87, 253
 - for inserting a component 318
- worksheets
 - exporting as HTML 102
 - exporting as RTF 101
 - formatting 107
 - hyperlinking 112
 - in pop-up window 112
 - including by reference 112
 - opening 101
 - opening from Internet 37
 - order of evaluation 122
 - posting on the Collaboratory 41
 - printing 30, 114
 - referencing in another worksheet 316
 - removing from the Collaboratory 42
 - retrieving from the Collaboratory 41
 - saving 30, 100
 - saving as Mathcad 6 or 7 format 102
 - saving as templates 103
 - sending by Email 116
- World Wide Web
 - accessing 36
 - bookmarks for browsing 37
 - browsing 36, 102
 - Collaboratory 40
 - HTML browsing 36, 102
 - MathSoft home page 36
 - toolbar 36
- wrapping equations 336
- WRITE function 214
- WRITEBMP function 215–216
- WRITEPRN function 214
- WRITERGB function 215–216
- WWW
 - See* World Wide Web
- X-Y plots
 - creating 236
 - formatting 245
 - QuickPlot 28
 - See also* plots, 2D
- Y_0 , Y_1 , and Y_n Bessel functions 176
- y-intercept 199
- zero threshold 136
- zeros of expressions or functions
 - See* roots
- Zeta function 338
- zooming
 - 2D plots 247
 - 3D plots 275
 - windows 18
- ztrans keyword 280, 282, 297
- z-transforms 280, 282, 297