

Index

- acnode, 89, 157
- additive, 36, 40
- affine
 - change of coordinates, 48
 - change of parameter, 73
 - equivalence, 48, 49
 - map, 48
- affine view, 118
 - principal, 119
- Agnesi's versiera, 11, 28, 132, 167, 193
- associate, 33
- astroid, 79, 84, 91, 134
- asymptote, 159
 - of hyperbola, 159
- auxiliary cubic, 208
- axis
 - of ellipse, 155
 - of hyperbola, 155
 - of parabola, 154
- Bézout's Theorem, 182
- base point, 222
- Bernoulli lemniscate, 91
- boomerang, 76, 101
- Brianchon's Theorem, 221
- bullet nose, 84, 88
- cardioid, 9, 186
- central reflexion, 54
- centre, 54, 150
 - of a circle, 152
 - of a hyperbola, 152
- Chain Rule, 46
- characteristic of a field, 25
- chord, 57
- circle, 5, 95, 100, 122, 124
 - centre of a, 152
 - pedal of, 80, 84
- circular points, 123, 152
- cissoid of Diocles, 7, 11, 146
- cofactor, 215
- collinear points, 52, 110, 214
- conchoid of Nicomedes, 12
- concurrent lines, 52, 214
- cone, 117
- congruent integers, 23
- conic, 2, 27
 - affine, 60
 - general, 63
 - matrix of, 64
 - prenormal form, 61
 - projective, 117, 142
 - vertex of, 55
- conjugate, 41
- coordinate switch, 49, 138
- coupler bar, 18
- crunode, 89, 157
- cubic curve
 - cuspidal, 191
 - Fermat, 169
 - geometric types of, 191
 - nodal, 191
 - non-singular, 191
 - projective, 117
 - Steiner, 133, 169, 204
 - Tschirnhausen's, 10
- curve
 - affine, 28
 - Bézier, 9
 - central, 54
 - circular, 123, 124
 - complex projective, 117
 - coupler, 18
 - cross, 160
 - cubic, 2, 27
 - dual, 213
 - eight, 74, 81, 126, 132, 157
 - Fermat, 104
 - Hessian, 165
 - implicitly defined, 1

- projective, 117
- quartic, 2, 27, 236
- rational, 96, 234
- real algebraic, 2
- real projective, 117
- singular, 80, 130
- cusp, 89, 157
- ordinary, 93
- deficiency, 241
- degree, 2, 35, 39
 - function, 34
- dehomogenization, 119
- delta invariants, 64, 134
- derivative, 45
- diameter, 57
- Diophantine equation, 101
- discriminant, 176
- divisible, 33
- divisors of zero, 24
- domain, 24
 - unique factorization, 34
- double slider, 15
- dual
 - curve, 213
 - plane, 203, 213
- eccentricity, 5, 155
- eight-curve, 121
- ellipse, 50, 98
 - imaginary, 61
 - real, 61, 62
- ellipsograph, 16
- Euler Lemma, 131, 134
- exceptional point, 234
- expansion
 - Maclaurin, 46
 - Taylor, 45
- factor, 33
 - proper, 33
 - trivial, 33
- Factor Theorem, 37
- field, 24
 - algebraically closed, 37
 - characteristic of, 25
 - ground, 26
 - of fractions, 25
- flex, 87, 162
 - on a cubic, 225
 - ordinary, 87, 162
- focus, 152
 - of ellipse, 155
 - of hyperbola, 156
 - of parabola, 154
- folium of Descartes, 98, 100, 167
- form, 42
- binary, 42
- cubic, 42
- linear, 42
- quadratic, 42
- ternary, 42
- Four Line Lemma, 140
- Four Point Lemma, 138
- four-leaved clover, 92, 93
- fractions, 25
- general linear group, 138
- general position, 138–140
- genus, 242
- group, 22
 - Abelian, 23
 - of a cuspidal cubic, 230
 - of a nodal cubic, 231
 - of a non-singular cubic, 232
 - structure on a cubic, 222
- hemisphere model, 116
- Hessian
 - curve, 165
 - determinant, 163
 - matrix, 163
 - quadratic form, 163
- highest order terms, 42
- homogeneous coordinates, 109, 201
- homogenization, 120
- hyperbola, 50, 61, 97, 98
- hyperplane, 209
- Implicit Function Theorem, 83, 166
- integrals, 106
- intersection number, 72, 126, 180
- intersection pattern, 75, 182
- irreducible, 33
- isotropic lines, 152
- Kempe, 18
- Lagrange method, 142
- lattice, 232
- limacon, 9
- line, 2, 27
 - at infinity, 115
 - complex conjugate, 114
 - imaginary parallel, 61
 - isotropic, 152
 - pair, 61, 63
 - parallel, 63
 - parametrized, 5, 203
 - projective, 117
 - real, 114
 - real parallel, 61
 - repeated, 61, 63
 - tangent, 6, 148

Index

249

- linear systems, 210
- linkage
 - four bar, 18
 - Watt, 13
- lowest order terms, 42
- Maltese cross, 81, 122, 134
- Menaechmus, 207
- mid-point, 54
- minor, 215
- monomial, 35
- motion
 - Newton, 16
 - planar, 12
- multiplicity, 77
 - of tangent, 92
- Multiplicity Inequality, 184
- Newton, 146
- Newton relations, 208
- nine associated points, 217
- nine point configuration, 171
- node, 89, 157
- normal form for
 - nodal cubic, 196
 - complex affine conic, 62
 - complex projective conic, 142
 - cuspidal cubic, 197
 - real affine conic, 61
 - real projective conic, 143
- open disc, 83
- order, 23
 - finite, 23
- Pappus Theorem, 220
- parabola, 50, 61, 63
 - pedal of, 80, 84, 100, 193
- parameter
 - regular, 6
- parametrized curve, 1
 - pedal of, 6
 - regular, 6
 - speed of, 1
- parametrized line, 5
- partial fraction, 106
- Pascal's Mystic Hexagon, 219
- Pascal's Theorem, 219
- pencil
 - of circles, 204
 - of conics, 204, 205, 211, 212
 - of cubics, 204
 - of curves, 203
 - of lines, 77, 203
- piriform, 22
- plane, 25
 - affine, 26
- dual, 203, 213
- fixed, 13
- moving, 13
- projective, 26, 109
- point
 - unit, 139
 - at infinity, 115, 202
 - base, 222
 - complex conjugate, 110
 - double, 77, 129
 - exceptional, 234
 - isolated, 83, 122
 - of projective n -space, 201
 - of projective plane, 109
 - ordinary, 92, 157
 - quadruple, 77, 129
 - real, 110
 - simple, 77, 129
 - singular, 80, 130
 - triple, 77, 129
- polynomial
 - constant, 36, 38
 - homogeneous, 42
 - in one variable, 35
 - in several variables, 38
 - linear part of, 42
 - quadratic part of, 42
 - real, 2, 41
 - value of, 36
- prenormal form, 61, 67, 236
- prime, 34
- projection
 - stereographic, 112
 - to a line, 173
- projective
 - n -space, 201
 - change of coordinates, 137
 - change of parameter, 126
 - codimension, 208
 - coordinate system, 137
 - dimension, 208
 - equivalence, 140
 - line, 201
 - map, 137, 209
 - subspace, 208
- proper intersection, 180
- quadratic transform, 237
- quadratic transformation, 236
- quartic equation, 207
- rational
 - affine curve, 96
 - function, 39
 - projective curve, 234
- regular
 - parameter, 6

250

Index

- parametrized curve, 6
- Remainder Theorem, 36
- residue classes, 23
- resultant, 176
 - in one variable, 175
 - in several variables, 177
 - matrix, 176
- right strophoid, 8
- rigid
 - equivalence, 51
 - mapping, 47
- ring, 24
- root
 - of an equation, 37
 - of unity, 38
- scaling, 49, 138
- secant method, 105
- semicubical parabola, 146
- serpentine, 28, 167, 193
- side of triangle, 133
- sphere model, 109, 117
- star operation, 221
- subadditivity, 209
- subadjoint, 242
- Subadjoint Lemma, 242
- tangent, 148
 - curves, 85
 - cuspidal, 89
 - flexional, 92, 163
 - line, 6, 85, 148
 - method, 105
 - ordinary, 92
 - vector, 1
- Three Point Lemma, 52
- three-leaved clover, 12
- tracing point, 13
- trajectory, 13
- triangle, 133
- undulation, 87, 162
- unit element, 24
- vertex
 - of a hexagon, 219
 - of a triangle, 133
 - of conic, 55
 - of reference, 139
- Weierstrass normal form, 194
- zero set, 2, 28, 117