

# Index

- action, 151
  - faithful, 153
  - transitive, 155
- algebraic element, 141
- algebraic integer, 143
- algebraic number, 143
- algebraic property, 13
- alternating group, 75
- annihilator, 93, 130
- associative, 10
- automorphism, 12, 87
  - inner, 35
- Betti number, 58
- bijection, 12, 175
- binary operation, 7
- binary structure, 7
- Binomial theorem, 86
- cardinality, 176
- cell, 173
- center, 27
- centralizer, 27
- characteristic, 101
- closed, 7
- codomain, 174
- coefficient, 89
  - leading, 89
- commutative, 9
- complex number
  - real part, 187
- complex number, 187
  - conjugate, 188
  - imaginary part, 187
  - modulus, 190
  - pole, 190
  - pure imaginary, 187
- complex plane, 189
- conjugacy class, 161
- conjugate, 34
- coset, 31
  - left, 31
  - right, 31
- cycle, 71
  - disjoint, 71
  - length, 71
  - notation, 72
  - trivial, 71
- dimension, 121
  - finite, 121
- divides, 4, 97
- divisor, 4, 97
  - greatest common, 49
  - of zero, 93
  - zero, 93
- domain, 174
- dual space, 129
  - second, 130
- dyadic rational, 9
- eigenspace, 126
- eigenvalue, 126
- eigenvector, 126
- equivalence class, 172
- Euler's formula, 191
- evaluation, 130
- factor, 4, 97
- field, 95
  - adjoined by, 137
  - conjugate over, 138
  - extension, 135
    - algebraic, 141
    - degree, 135
    - simple, 137
    - transcendental, 141
  - Galois, 146
  - generated, 137
  - number, 143
  - prime, 102
  - splitting, 139
  - tower of, 136
- finite, 176
- formal sum, 89
- function, 174
  - bijjective, 12, 175
  - composition, 174
  - injective, 12, 175
  - inverse, 176

- one-to-one, 12, 175
- one-to-one correspondence, 175
- onto, 12, 175
- surjective, 12, 175
- G-set, 151
- Gaussian integers, 24
- group, 16
  - symmetric, 65
  - abelian, 19
  - action, 151
    - faithful, 153
    - transitive, 155
  - alternating, 75
  - cyclic, 47
  - dihedral, 67
  - finite, 20
  - general linear, 16
  - generator, 47
  - homomorphism, 39
  - infinite, 20
  - Klein four-, 21
  - p-, 164
  - quaternion, 162
  - quotient, 42
  - simple, 45
  - special linear, 24
  - subgroup, 23
  - torsion free, 56
  - trivial, 21
- homomorphism, 39, 87
  - evaluation, 96
  - group, 39
  - kernel, 40, 88
  - natural projection, 45
  - ring, 87
- ideal, 105
  - maximal, 107
  - prime, 108
  - principal, 107
- identity, 13
  - left, 13
  - right, 13
- image, 174
  - inverse, 40, 174
- imaginary axis, 189
- indeterminate, 89
- index, 33
- infinite, 176
- injection, 12, 175
- integral domain, 94
- invariant subset, 156
- inverse, 14
  - left, 14
  - right, 14
- isomorphic, 12, 87, 123
- isomorphism, 12, 87, 123
- kernel, 40, 88, 123
- linear combination, 116
- linear functionals, 129
- linear operator, 127
  - locally nilpotent, 129
  - nilpotent, 127
    - index, 127
- linear transformation, 123
  - kernel of a, 123
  - nonsingular, 125
- linearly independent, 117, 118
- matrix, 179
  - determinant, 184
  - identity, 181
  - inverse, 182
  - invertible, 182
  - lower triangular, 185
  - product, 180
    - row-column expansion, 181
  - scalar product, 180
  - square, 179
  - sum, 180
  - zero, 179
- module, 114
- multiple, 4, 97
  - least common, 4
- multiplication
  - scalar, 113
- normalizer, 163
- null space, 125
- nullity, 125
- operation
  - induced, 23
- orbit, 71, 154
- order, 20
  - finite, 20, 28
  - infinite, 20, 28
  - of an element, 28
- partition, 173
- permutation, 65
  - even, 74
  - odd, 74
  - parity, 74
  - sign, 75
- polynomial, 89
  - coefficient, 89
    - leading, 89
  - constant, 90
  - cyclotomic, 144
  - degree, 89
  - irreducible, 102
  - minimal, 142
  - monic, 89
  - reducible, 102
  - ring, 90

- root, 97
- splits, 139
- term, 89
  - constant, 89
  - leading, 89
  - zero, 89
- preimage, 40, 174
- primitive element, 137
- product, 171
  - Cartesian, 171
  - direct, 53
  - external direct, 53
- quaternions, 95
- quotient, 5
- range, 174
- rank, 125
  - full, 126
- real axis, 189
- related, 172
- relation, 172
  - equivalence, 172
  - not well-defined, 174
  - undefined, 174
- relatively prime, 49
- remainder, 5
- ring, 83
  - characteristic, 101
  - commutative, 84
  - homomorphism, 87
  - polynomial, 90
  - quotient, 106
  - simple, 107
  - with unity, 84
- root of unity, 24, 194
  - primitive, 51, 194
- scalar, 114, 180
- span, 116
- spanning set, 116
- subdomain, 94
- subgroup, 23
  - conjugate, 35
  - cyclic, 27
  - finitely generated, 29
  - generated by a set, 29
  - generator of, 27
  - improper, 24
  - index, 33
  - isotropy, 155
  - normal, 42
    - maximal, 46
  - normalizer, 163
  - $p$ -, 164
    - Sylow, 164
  - stabilizer, 155
  - torsion, 56
  - trivial, 24
- subgroup lattice, 50
- subring, 86
  - generated by a set, 87
- subspace, 115
  - spanned by  $A$ , 116
  - sum of, 116
- surjection, 12, 175
- term, 89
  - constant, 89
  - leading, 89
- transcendental element, 141
- transposition, 71
- tuple, 171
- unit, 84
- unity, 84
- upper triangular, 185
- vector, 114
- vector space, 113
  - Banach space, 116
  - isomorphism, 123
- zero divisor, 93
- zero of a polynomial, 97