

Index

- adjunction of indeterminates, 34
- algebra, 42
- algebra generated by a set, 44
- algebra-homomorphism, 43
- algebra-isomorphism, 43
- algebra of differential forms, 168
- algebra of differential operators, 126
- alternating bilinear form, 100
- alternating matrix, 104
- alternating multilinear mapping, 6
- anticommutative algebra, 54
- associative law for tensor products, 28

- base of a free module, 2
- bilinear form, 97

- coalgebra, 133
- coassociative mapping, 133
- commutative coalgebra, 150
- commutative Hopf algebra, 154
- complete representation of a module as a direct sum, 26
- multiplication mapping of a coalgebra, 133
- contravariant functor, 176
- counit of a coalgebra, 133
- covariant extension of a module, 30
- covariant extension of an algebra, 56
- covariant extension of an exterior algebra, 95
- covariant extension of a symmetric algebra, 122
- covariant extension of a tensor algebra, 75
- covariant functor, 23

- derivation on an algebra, 57
- determinant of an endomorphism, 90

- diagonalization mapping of a coalgebra, 133
- diagonalization mapping of $E(M)$, 159
- diagonalization mapping of $S(M)$, 164
- differential form, 168
- differential operator, 124
- doubling of degrees, 63
- dual of a graded module, 179
- dual of a homomorphism, 176
- dual of a module, 96

- endomorphism algebra of a module, 43
- exterior algebra of a direct sum, 93
- exterior algebra of a free module, 89
- exterior algebra of a module, 86
- exterior powers of a matrix, 93
- exterior powers of a module, 8

- finite free module, 177
- flat module, 33
- free algebra generated by a set, 59
- free module, 2
- free module generated by a set, 2

- generalized derivation, 63
- generalized skew derivation, 64
- generic alternating matrix, 110
- graded algebra, 47
- graded coalgebra, 134
- graded dual of a graded algebra, 187
- graded dual of a graded coalgebra, 185
- graded dual of a graded Hopf algebra, 191
- graded dual of a graded module, 179
- graded Hopf algebra, 155
- grading on a module, 132
- Grassmann algebra of a module, 163

198 *Index*

- homogeneous element, 47
- homogeneous ideal, 48
- homomorphism of algebras, 43
- homomorphism of coalgebras, 134
- homomorphism of graded algebras, 48
- homomorphism of graded coalgebras, 134
- homomorphism of graded modules, 179
- homomorphism of Hopf algebras, 154
- homothety, 43
- Hopf algebra, 153

- isomorphism of coalgebras, 134
- isomorphism of graded algebras, 48
- isomorphism of graded coalgebras, 134
- isomorphism of Hopf algebras, 154

- Laplace's expansion of a determinant, 92
- linear form on a module, 46

- main involution of a graded algebra, 64
- McCoy's theorem, 14
- modified Hopf algebra, 155
- modified tensor product of graded algebras, 52
- modified tensor product of graded coalgebras, 146
- multilinear mapping, 1
- multiplication mapping of an algebra, 131
- multiplicatively closed subset of a ring, 35

- Nakayama's lemma, 32
- non-negative grading on an algebra, 47

- opposite of a ring or algebra, 169

- permanent of a square matrix, 129

- Pfaffian of an alternating matrix, 104
- projective module, 27

- rank of a free module, 14, 90
- right exactness of tensor products, 24
- ring of fractions, 35

- skew-commutative algebra, 150
- skew-commutative coalgebra, 150
- skew-commutative modified Hopf algebra, 156
- skew derivation on an algebra, 57
- structural homomorphism of an algebra, 43
- subalgebra, 43
- symmetric algebra of a direct sum, 121
- symmetric algebra of a module, 119
- symmetric multilinear mapping, 10
- symmetric powers of a module, 11

- tensor algebra of a free module, 74
- tensor algebra of a module, 72
- tensor powers of a module, 6
- tensor product of algebras, 44
- tensor product of coalgebras, 138
- tensor product of homomorphisms, 22
- tensor product of Hopf algebras, 157
- tensor product of modules, 4
- total grading on a tensor product, 50, 132
- trivial grading, 50
- trivial ring, 1
- twisting isomorphism, 61
- twisted tensor product of algebras, 61

- unit mapping of an algebra, 131
- universal problem for multilinear mappings, 2

- wedge notation for exterior algebras, 88