

Author Index

- Accardi, Luigi, 100, 118, 171
 Akheizer, N. I., 118
 Almkvist, Gert, 360
 Alperin, Jonathan L., 5, 56
 Ashley, Jonathan, 291
 Badoian, Leslie, 412
 Bailey, R. A., 2, 31, 41, 177, 195, 200, 229, 240, 244, 246, 250, 271
 Baker, Kirby A., 281, 288
 Bannai, Eiichi, 2, 31, 41, 143
 Bannai, Etsuko, 31, 41
 Bartholdi, Laurent, 2
 Bass, Hyman, 270, 350
 Bell, Rowen B., 5, 56
 Bellman, Richard, xv
 Ben Ghorbal, A., 171
 Beth, T., 251
 Biggs, Norman, 142
 Binet, J. P. M., 219
 Block, Louis, 327
 Bożejko, Marek, 118, 171
 Bochner, Salomon, 15
 Bogart, Kenneth P., 23
 Bollobás, B., 203
 Bose, R. C., 177
 Bowen, Rufus, 313, 324–327, 394
 Boyle, Mike, 268, 281, 287, 288, 291, 293, 297–299, 303, 304, 306–308, 311, 312, 323, 326, 328–331, 336, 337, 339, 341–343, 346, 350, 352, 363, 365, 367, 368, 370, 376, 377, 379, 382–385, 388–390, 393, 395, 399, 403, 405, 409
 Brin, Michael, 343
 Brouwer, Andries, 142
 Buekenhout, F., 262
 Bump, Daniel, 3
 Burnside, William, 23
 Cakiroglu, A., 261
 Cameron, P. J., 41, 229, 244, 246, 250, 251, 271
 Carlsen, Toke-Meier, 312, 326, 330
 Cauchy, A. L., 23, 219
 Cayley, A., 206, 221
 Ceccherini-Silberstein, Tullio, 3, 5, 23, 24, 26, 34, 45, 46, 48, 55, 56, 60–63, 66, 67, 69, 70, 78, 271
 Cheeger, J., 211
 Cheng, C.-S., 240
 Chihara, T. S., 118
 Christensen, R., 182
 Chuysurichay, Sompong, 271, 393
 Clarke, B. R., 182
 Cohen, A. M., 143, 262
 Corsini, Piergiulio, 41
 Costa, Alfredo, 326
 Coven, Ethan M., 394
 Cuntz, Joachim, 281, 307, 308
 Cvetković, Dragoš, 142
 Cyr, Van, 394
 D'Angeli, Daniele, 2
 Delsarte, Philippe, 2
 Dhahri, A., 143
 Diaconis, Persi, 2, 4, 46, 51, 55
 Dieudonné, Jean, 5
 Donno, Alfredo, 2
 Donoso, Sebastián, 375, 394
 Dunkl, Charles F., 2, 45
 Durand, Fabien, 311, 375, 394
 Dym, Harry, 5
 Effros, Edward G., 311, 363
 Ehrenfest, Paul, 52

- Ehrenfest, Tatiana, 52
 Eilers, Søren, 312, 326, 330
 Epperlein, Jeremias, 403, 405, 412
 Euler, L., 247
 Faraut, Jacques, 5
 Farrell, F. T., 351
 Fiebig, Ulf-Rainer, 387, 388, 390, 399
 Figà-Talamanca, Alessandro, 4, 5
 Fisher, R. A., 177, 192
 Franks, John, 313, 324–327
 Friedland, Shmuel, 342
 Frisch, Joshua, 395
 Frobenius, Ferdinand Georg, 23, 24, 59, 70
 Fulton, William, 5, 56
 Gelfand, I. M., xiv, 2, 15
 Geller, Susan C., 357
 Gilmer, Patrick M., 268
 Ginzburg, David, 3
 Giordano, Thierry, 311
 Glendinning, P. A., 220
 Godsil, Christopher D., 41
 Gomez, Ricardo, 271
 Goodearl, Kenneth R., 311
 Grayson, Daniel R., 360, 370
 Grigorchuk, Rostislav I., 2
 Gromov, Mikhael, xiv
 Grunewald, Fritz J., 298
 Guckenheimer, John, 327
 Gudder, Stanley P., 100
 Haemers, Willem, 142
 Hanani, H., 253
 Handelman, David E., 268, 288, 297, 298,
 306, 307, 311, 331, 336, 337, 339, 341,
 342, 345, 346, 363
 Harmon, Dennis R., 352
 Harris, Joe, 5, 56
 Hartman, Yair, 379, 390–393
 Hasegawa, H., 118
 Hashimoto, Y., 118, 142
 Hatcher, Allen, 406
 Hedlund, Gustav A., 274, 380, 388, 394
 Helgason, Sigurdur, 5
 Hiai, F., 100
 Higman, G., 352, 354, 357, 358
 Hoffman, A. J., 263
 Holton, D. A., 40, 203
 Hora, Akihito, 100, 142, 143
 Host, Bernard, 394
 Igarashi, D., 142
 Isaacs, I. Martin, 5, 56
 Ito, Tatsuro, 2, 31, 41, 143
 Jackson, B., 260
 Jafarzadeh, M. A., 118
 Jafarzadeh, S., 118
 Jeandel, Emmanuel, 268, 271
 Jerrum, Mark, 48
 Jewett, R. J., 45
 Johnson, Charles R., 271, 330, 331, 337, 340,
 343, 345
 Johnson, J. R., 261
 Jungnickel, D., 251
 Köllmer, Heinrich, 308
 Kagan, M., 216
 Kang, Y., 118
 Kaplansky, Irving, 307
 Kesten, Harry, 143
 Kiefer, J., 238
 Kim, Ki Hang, 266, 268, 270, 280, 281, 287,
 288, 291, 298, 305, 328, 329, 337, 338,
 373, 376, 386–390, 397, 399, 400,
 405–409, 411, 413
 Kirkman, T. P., 251
 Kitchens, Bruce P., 282, 291
 Knuth, D. E., xv
 Konno, N., 118
 Koohestani, M., 143
 Kopra, Johan, 271, 379
 Kra, Bryna, 379, 390–394
 Krieger, Wolfgang, 271, 281, 307, 308, 311,
 381, 384, 385, 396, 397, 399
 Krivelevich, M., 223
 Kshirsagar, A. M., 238
 Kulkarni, A., 171
 Laffey, Thomas J., 270, 337–340, 342, 345
 Latimer, Claiborne G., 299
 Lenczewski, R., 171
 Lenz, H., 251
 Leoreanu-Foteal, Violeta, 41
 Levi, F. W., 226
 Levya, M. T. G., 143
 Lin, Chao-Hui, 268
 Lind, Douglas, 280, 282, 287, 305, 307, 308,
 311, 312, 373, 376, 377, 379, 380,
 382–384, 389, 390, 396, 397, 405
 Loewy, Raphael, 331, 337, 338, 343
 London, David, 331, 343
 Long, Nicholas, 383
 Lu, Y. G., 118, 171
 Lubotzky, A., 211
 Maass, Alejandro, 375, 394

- Macdonald, Ian G., 3
 MacDuffee, Cyrus C., 299
 Machi, Antonio, 56
 Mackey, George W., 56, 59–61
 MacWilliams, F. Jessie, 41
 Maller, Michael, 271, 293, 294, 363, 369
 Marcus, Brian, 280, 282, 287, 299, 305, 307,
 308, 311, 312, 373, 376, 384, 396, 397
 Marcus, Daniel A., 290
 Margulis, G. A., 211
 Marijuán, Carlos, 330, 340
 Matui, Hiroki, 311
 McKean, Henry, 5
 Mednykh, A., 221, 271
 Meehan, Eleanor, 340, 342
 Merino, C., 260
 Meyer, Paul-André, 100
 Milnor, John, 270, 350, 355, 357
 Mischaikow, Konstantin, 268, 311
 Misiurewicz, Michał, 327
 Mohar, B., 203, 211
 Morales, J. V. S., 143
 Morgan, J. P., 252, 261
 Morse, Marston, 394
 Munemasa, Akihiro, 271
 Muraki, N., 171
 Naimark, Mark A., 5, 15, 56
 Nasu, Masakazu, 377, 395, 399
 Nebbia, Claudio, 5
 Neeman, Amnon, 368
 Nenashev, A., 368
 Neumaier, Arnold, 143
 Neumann, Peter M., 23
 Newman, Morris, 296, 299
 Nica, A., 100
 Obata, Nobuaki, 100, 118, 142, 143, 171
 Okounkov, Andrei, 2
 Oliver, Robert, 350, 352
 Olli, Jeanette, 375, 394
 Ormes, Nicholas S., 338
 Paparella, Pietro, 330, 340
 Parreau, François, 394
 Parry, William, 288, 307, 308, 312, 313, 324,
 326, 327, 329, 330
 Parthasarathy, K. R., 100
 Perrin, Dominique, 311, 327
 Peter, Fritz, 4, 13
 Petite, Samuel, 375, 394
 Petz, D., 100
 Phillips, R., 211
 Piatetski-Shapiro, Ilya I., 4, 69
 Pisonero, Miriam, 330, 340
 Poincaré, Henri, xiv
 Putnam, Ian F., 311
 Ranicki, Andrew, 368
 Reed, Michael, 15
 Reiner, Irving, 309
 Restorff, Gunnar, 326
 Rhodes, F., 388
 Riedel, Norbert, 289, 290
 Roberts, Leslie G., 357
 Rørdam, Mikael, 326
 Rosenberg, Jonathan, 270, 346, 349–351
 Roush, Fred W., 266, 268, 270, 280, 281, 287,
 288, 291, 298, 305, 328, 329, 337, 338,
 373, 376, 386–390, 397, 399, 400,
 405–409, 411, 413
 Rowlinson, Peter, 142
 Royle, Gordon F., 41
 Rudolph, Daniel, 268, 376, 377, 379, 382,
 383, 389, 390, 405
 Ruiz, Efren, 326
 Ryan, J. Patrick, 379, 380, 395
 Saigo, H., 118
 Saito, S., 118
 Sajjad, A., 246
 Salo, Ville, 379, 392, 394
 Sarnak, Peter, 211
 Saville, D. J., 182
 Saxl, Jan, 2
 Scarabotti, Fabio, 3, 5, 23, 24, 26, 34, 45, 46,
 48, 55, 56, 60–63, 66, 67, 69, 70, 78
 Schlank, Tomer, 395
 Schmüdgen, K., 118
 Schmieding, Scott, 303, 304, 312, 342, 350,
 352, 363, 365, 367, 368, 370, 379,
 390–394
 Schumacher, R., 261
 Schur, Issai, 4, 10, 24
 Segal, Daniel, 298
 Segal, Irving E., 15
 Segawa, E., 118
 Seneta, Eugene, 343
 Serre, Jean-Pierre, 5, 56, 350
 Shah, K. R., 236
 Shahshahani, Mehrdad, 3, 51, 55
 Shannon, Claude E., 326
 Sheehan, John, 40, 203
 Sheiham, Desmond, 360
 Shen, Chao-Liang, 311
 Shohat, J. A., 118

- Shrikhande, S. S., 258
 Shub, Michael, 271, 293, 294, 363, 369
 Silver, Daniel S., 268
 Silvester, John R., 270
 Simić, Slobodan, 142
 Simon, Barry, 5, 15, 56
 Singleton, R. R., 263
 Sinha, B. K., 236
 Skau, Christian F., 311
 Sloane, Neil J. A., 41
 Šmigoc, Helena, 338
 Soicher, L. H., 250
 Sørensen, Adam P.W., 326
 Speicher, Roland, 100, 171
 Srivastav, S. K., 252
 Stanley, R. P., 259
 Stanton, Dennis, 2
 Steinberg, Benjamin, 326
 Stern, Alexander I., 5, 56
 Sternberg, Shlomo, 5, 56
 Sudakov, B., 223
 Sufiani, R., 118
 Sugiyama, S., 118
 Suleïmanova, H. R., 330, 342
 Sullivan, Dennis, 313, 324, 326, 329
 Sullivan, Michael C., 288, 312
 Suppes, Patrick, 100
 Sylvester, J. J., 247
 Törmä, Ilkka, 394
 Tabei, Nobuyuki, 118, 142
 Tamarkin, J. D., 118
 Tamuz, Omer, 395
 Tanaka, H., 143
 Tanaka, Rie, 41
 Tarry, G., 247
 Taussky, Olga, 289, 299, 308
 Terras, Audrey, 2
 Thomassen, C., 260
 Tolli, Filippo, 3, 5, 23, 24, 26, 34, 45, 46, 48,
 55, 56, 60–63, 66, 67, 69, 70, 78
 Trow, Paul, 299, 308
 Tuncel, Selim, 308, 312
 Tutte, W. T., 257
 Uvarov, Vasilii B., 35
 van Lint, Jack, 41
 van der Kallen, Wilberd, 357, 411
 Vargas, J. G., 171
 Vershik, Anatoly M., 2, 88
 Voiculescu, D. V., 171
 Volovich, I., 118
 von Neumann, John, 100
 Wagoner, John B., 266, 270, 279–281, 291,
 311, 323, 326, 328, 329, 346, 363,
 386–390, 399–413
 Wall, H. S., 118
 Walters, M., 261
 Weibel, Charles A., 268–270, 311, 348,
 350–352, 354–357, 359, 412
 Welsh, D. J. A., 260
 Weyl, Hermann, xiv, 4, 13
 Whitehead, J. H. C., 347–349, 393
 Wielandt, Helmut, 24
 Wigner, Eugene P., 56, 61
 Williams, E. R., 250
 Williams, R. F., 266, 268, 270, 278, 280, 281,
 287, 307, 323, 362, 363, 389, 399, 400,
 402, 403, 405, 412
 Williams, Susan G., 268
 Wilson, Richard M., 41, 251
 Wolf, Joseph, 5
 Wood, G. R., 182
 Woroudi, R., 171
 Wright, Edward M., 23
 Wu, Yaokun, 271
 Yang, Kitty, 394, 395
 Yates, F., 177
 Yoo, H. J., 143
 Young, Lai-Sang, 327
 Zakharevich, Inna, 270
 Zhu, Yinfeng, 271
 Zieschang, Paul-Hermann, 2, 41

Subject Index

- A-optimal block design, 237
- abelian group, 15, 17, 177, 221, 325
 - Pontryagin duality, 17
- abelianization, 347
- action, 5
 - distance transitive, 20
 - two-point homogeneous, 20
- acyclic orientation, 259
- additive character of $\mathbb{F}_q$, 72
 - principal, 72
- adjacency algebra, 42, 119
- adjacency matrix, 27, 119, 196, 208
- adjoint, 220
- adjoint operator, 6
- affine group over $\mathbb{F}_q$, 73
- affine plane, 194
- algebra
 - adjacency, 42
 - Bose–Mesner, 42
 - group algebra, 8
 - Hecke, 64
 - unital $\ast$ -algebra, 65
- algebraic probability space, 93
- algebraic random variable, 93
- Algebraic Shift Equivalence Problem, 363
- ambivalent group, 20, 44
- anti-automorphism of a group, 67
- arcsine law, 90, 117, 128, 157, 158
- Ashley's eight by eight, 291
- association scheme, 41, 91, 195, 224
 - as a hypergroup, 46
 - associated with a Gelfand pair, 43
 - associated with a group, 42
 - associated with a group action, 43
 - associated with a symmetric Gelfand pair, 43
 - associated with the conjugacy classes on a finite group, 43
 - commutative, 42
 - symmetric, 42
- automorphism group, 373–376, 379, 380, 385, 390, 391, 393, 394, 399
- balanced incomplete-block design, 185, 238
- Bernoulli distribution, 107, 115, 160
- best linear unbiased estimator, 182
- bicolorable graph, 29
- bidual of an abelian group, 17
- binary block design, 185
- binomial distribution, 143
- bipartite graph, 29
- block design, 176
 - A-optimal, 237
 - affine plane, 194
 - balanced, 185, 238
 - binary, 185
 - connected, 197, 229
 - cyclic, 193
 - D-optimal, 237
 - dual, 240
 - E-optimal, 238
 - equireplicate, 184
 - group-divisible, 196, 240, 261
 - optimal, 236
 - partially balanced, 195, 240
 - projective plane, 194
 - queen-bee, 184, 242
 - square lattice, 194, 240
 - variance-balanced, 251, 262
- BLUE, 182
- Boolean CLT, 160
- Boolean convolution, 166
- Boolean cumulant, 168

- Boolean independence, 159
- Borel subgroup of $GL(2, \mathbb{F}_q)$, 69, 75
 - representation theory, 76
- Bose–Mesner algebra, 42
- boson Fock space, 114
- Bowen–Franks group, 313, 324–326, 394
- bridge, 260
- Bruhat decomposition of $GL(2, \mathbb{F}_q)$, 69, 75
- Burnside lemma, 24
- cabbages, 177
- Carleman’s condition, 110
- Carleman’s moment test, 96
- Cartan subgroup of $GL(2, \mathbb{F}_q)$, 75
- Cartesian product graph, 149
- Catalan number, 112
- category theory, 326
- Cauchy–Binet formula, 219
- Cauchy–Stieltjes transform, 109
- Cayley table, 259
- Cayley’s Theorem, 206, 221
- center
 - of $GL(2, \mathbb{F}_q)$, 75
 - of Steinberg group, 356
- central function, 14
- central limit theorem (CLT)
 - Boolean, 160
 - classical, 144
 - commutative, 147
 - monotone, 157
- character
 - additive character of $\mathbb{F}_q$, 72
 - conjugate, 73
 - decomposable, 73
 - extension, 61
 - Frobenius character formula, 59
 - indecomposable, 73
 - multiplicative character of $\mathbb{F}_q$, 72
 - of a representation, 12
 - orthogonality relations, 14
 - principal multiplicative character of $\mathbb{F}_q$, 73
- Chebyshev polynomials
 - of the first kind, 117
 - of the second kind, 116
- Cheeger’s Inequality, 211
- chromatic polynomial, 256
- classical CLT, 144
- classical convolution, 161
- Classification Problem, 277
- classification problem, 275, 280, 373, 383, 399, 400
- Clebsch graph, 40
- cluster expansion, 256
- cofactor, 218
- coin toss, 107
- comb product graph, 149
- commutant
 - of one representation, 10
 - of two representations, 10
- commutative association scheme, 42
- commutative CLT, 147
- commutative independence, 147
- complement of a graph, 40
- complete graph, 36
- complete-block design, 181
- completely symmetric matrix, 191
- concurrence graph, 227
- concurrence matrix, 187
- concurrence of two treatments, 190
- conductance, 215
- confidence interval, 230
- confidence region, 237
- conjugacy class, 14
- conjugate
 - character, 73
 - of an element in $\mathbb{F}_{q^2}$, 71
 - representation, 7
- connected block design, 197, 229
- connected components, 204
- connected graph, 204, 229
- contrast, 199, 201
- control, 185
- convergence in moments $\xrightarrow{m}$, 97
- convolution
 - Boolean, 166
 - classical, 161
 - Mellin, 169
 - monotone, 164
- convolution in $L(X)$, 26
- covariance, 198
- critical group, 221
- Curtis–Hedlund–Lyndon theorem, 274, 283, 375
- cuspidal representation of $GL(2, \mathbb{F}_q)$, 69, 79
- cut-off phenomenon, 3, 46, 56
- Cutset Lemma, 210
- CW-complex, 401
- cyclic block design, 193
- cyclic group, 259
- D-optimal block design, 237
- decomposable character, 73
- Decomposition Theorem, 279, 287, 288, 402
- degenerate, 286, 403

Subject Index

429

- degree of a regular graph, 27
- δ -measure, 96
- density matrix, 94
- determinate moment problem, 96
- diagonalizable matrix, 191
- dimension group, 301, 311, 380, 391
- dimension of a representation, 5
- dimension representation, 373, 380, 382, 394, 397, 404, 407
- direct sum of representations, 7
- discrete circle, 35
- discrete Laplacian, 28
- distance
 - Hamming, 36, 54, 134
 - Johnson, 37
- distance-regular graph, 30, 133, 196, 205, 224, 248
 - spherical function, 33
- distance-transitive graph, 224, 248
- distribution
 - m th iterate, 47
 - Bernoulli, 107, 115, 160
 - binomial, 143
 - eigenvalue, 120
 - initial, 47
 - Kesten, 127
 - Poisson, 97, 136
 - probability, 47
 - spectral, 95
 - standard normal, 96, 115
 - stationary, 47
 - uniform, 47
 - vacuum spectral, 102
- double coset, 18
- dual
 - group of $\mathbb{F}_q$, 72
 - group of $\mathbb{F}_q^*$, 72
 - of a group, 7
 - orthogonality relations for matrix coefficients, 12
- dual design, 240
- E-optimal block design, 238
- Ehrenfest diffusion model, 52
 - asymptotics, 55
- eigenvalue distribution, 120
- elementary equivalence, 364, 370
- elementary matrices, 317, 323, 325, 328, 338, 347, 348, 355, 357, 393, 410, 411
- elementary row/column operations, 347
- elementary strong shift equivalent, 267
- endomorphism, 267
- equireplicate block design, 184
- equivalent representations, 6
- ESSE, 267
- estimation, 181, 198, 201, 230
- estimator
 - unbiased, 181, 230
- eventually conjugate, 292, 305
- experimental units, 177
- extension
 - norm of a field extension, 70
 - of a character, 61
 - of a field, 69
 - trace of a field extension, 70
- faithful representation, 10
- Fano plane, 186, 195
- fermion Fock space, 108, 114
- finite graph, 27
 - path, 27
- Finite Order Generation Problem, 388, 389
- Fisher's Inequality, 192
- flow equivalence, 287, 313, 324–327, 329, 393
- forest, 206
- formula
 - Frobenius character formula, 59
 - Mackey formula for invariants, 60
- Fourier transform
 - inversion formula for the spherical Fourier transform, 25
 - spherical, 25
- free Fock space, 111, 116
- Frobenius
 - automorphism, 70
 - character formula, 59
 - reciprocity law, 59
- function
 - K -invariant, 17
 - bi- K -invariant, 17
 - central, 14
 - positive-definite, 14
 - spherical, 21
 - spherical function on a distance-regular graph, 33
- G -invariant stochastic matrix, 49
- galaxy, 249
- Gelfand pair, 19
 - association scheme associated with a Gelfand pair, 43
 - association scheme associated with a symmetric Gelfand pair, 43
 - symmetric, 20
 - weakly symmetric, 20

- general linear group $GL(2, \mathbb{F}_q)$, 69
- generalized inverse, 197, 212
- generalized quadrangle, 240
- geometric mean, 219, 237
- $GL(2, \mathbb{F}_q)$, 75
 - Borel subgroup, 75
 - Cartan subgroup, 75
 - center, 75
 - conjugacy classes, 76
 - cuspidal representation, 69, 79
 - parabolic representation, 69
 - representation theory, 77
 - representation theory of the Borel subgroup, 76
 - unipotent subgroup, 75
- GNS-construction, 15
- graph, 204
 - adjacency matrix, 27, 119, 196, 208
 - bicolorable, 29
 - bipartite, 29
 - Clebsch, 40
 - complement, 40
 - complete, 36
 - concurrence, 227
 - connected, 204, 229
 - degree of a regular graph, 27
 - distance-regular, 30, 133, 196, 205, 248
 - distance-transitive, 224, 248
 - finite, 27
 - Hamming, 134
 - Hoffman–Singleton, 263
 - incidence, 226
 - Levi, 225
 - Moore, 263
 - Petersen, 40, 203, 205
 - primitive, 40
 - regular, 27, 118, 204
 - simple, 204
 - strongly regular, 38, 196, 204, 224, 258
 - Sylvester, 247, 248
 - triangular, 40
 - weighted, 204
- graph product, 148
- group
 - abelian, 15, 17, 177, 221, 325
 - affine group over $\mathbb{F}_q$, 73
 - algebra, 8
 - ambivalent, 20, 44
 - anti-automorphism, 67
 - bidual of an abelian group, 17
 - Borel subgroup of $GL(2, \mathbb{F}_q)$, 69
 - dual, 7
 - general linear group $GL(2, \mathbb{F}_q)$, 69
 - inertia, 61
 - Pontryagin duality for an abelian group, 17
 - Steinberg, 356
 - symmetric group, 9
 - unipotent subgroup of $GL(2, \mathbb{F}_q)$, 69
- group-divisible design, 196, 240, 261
- gyration map, 385
- gyration representation, 385
- Hamburger theorem, 95
- Hamming distance, 36, 54, 134
- Hamming graph, 134, 163
- Hamming scheme, 36
- harmonic mean, 217, 237
- heart disease, 179
- Hecke algebra, 64
 - commutative, 66
- hierarchical product graph, 149
- Higman's trick, 352, 357, 358
- Hilbert Satz 90, 71
- Hoffman–Singleton graph, 263
- homogeneous space, 17
- homogeneous tree, 125
- hypercube, 54
 - simple random walk, 54
- hypergroup, 45
- idempotent, 192
- incidence matrix, 187
- incomplete-block design, 183
- indecomposable character, 73
- independence
 - Boolean, 159
 - commutative, 147
 - monotone, 154
- index, 57
- induced representation, 56
 - and tensor products, 59
 - character, 59
 - matrix coefficients, 58
 - transitivity, 58
- inert automorphism, 383, 385–392, 399
- inertia group, 61
- inflation of a representation, 58
- information matrix, 187, 197
- initial distribution, 47
- interacting Fock space (IFS), 101
- internal tensor product of representations, 16
- intertwiner of two representations, 10
- invariant
 - K -invariant function, 17

Subject Index

431

- bi- K -invariant function, 17
 - subspace, 5
- irreducible representation, 5
- isoperimetric number, 206
- iterate distribution, 47
- Jacobi coefficients, 100
- Jacobian group, 221
- Jacquet module of a representation, 78
- Johnson
 - distance, 37
 - scheme, 37
- K_1 of a ring, 347, 348
- K_2 of a ring, 355, 356
- Kesten distribution, 127
- Kirchhoff's laws, 215
- Klein group, 259
- Krawtchouk polynomials, 37, 55
- Kronecker product graph, 151
- lag, 278, 280, 281, 288–290, 294, 295, 305, 307, 310, 369
- Laplacian, 28
- Laplacian eigenvalues, 207
- Laplacian matrix, 187, 197, 207, 228
- Latin square, 194, 259
- left coset, 17
- left regular representation, 8
- Levi graph, 225
- lexicographic product graph, 151
- locally finite graph, 119
- low replication, 242
- Mackey
 - formula for invariants, 60
 - intertwining number theorem, 60
 - irreducibility criterion, 60
 - lemma, 61
 - theory, 59
- Mackey–Wigner little group method, 61
- mapping class group of a subshift, 393, 394
- Markov chain, 46, 222
 - G -invariant transition matrix, 49
 - cut-off phenomenon, 56
 - distribution, 47
 - initial distribution, 47
 - transition matrix, 46
- Markov matrix, 28
- matrix
 - ergodic, 47
 - Markov, 28
 - nonnegative, 330
 - stochastic, 46
 - transition, 46
 - variance-covariance, 198
- matrix coefficient
 - dual orthogonality relations, 12
 - orthogonality relations, 11
- matrix coefficient of a representation, 11
- Matrix-Tree Theorem, 219
- maximum trace, 252
- Mellin convolution, 169
- Merino–Welsh conjecture, 260
- minor, 218
- mixed moment, 93
- Möbius inversion, 284, 336
- module
 - projective, 353
- moment equivalent $\stackrel{m}{=}$, 93
- moment generating function, 166
- moment sequence, 93
- monotone CLT, 157
- monotone convolution, 164
- monotone independence, 154
- Moore graph, 263
- Moore–Penrose inverse, 197, 214
- morphism, domain and codomain, 267
- multiplicative character of $\mathbb{F}_q$, 72
 - principal, 73
- multiplicity of a representation, 13
- multiplicity-free
 - representation, 20
 - spherical function for a multiplicity-free triple, 67
- triple, 66
- Nikiforov, Arnold F., 35
- Nil_0 of a ring, 353
- nilpotent extension, 369, 371, 372
- NK_1 of a ring, 350, 351
- nondegenerate, 278, 280, 286, 304, 329, 403
- nonnegative definite, 192, 197, 208
- nonnegative matrix, 330
- nonzero spectrum, 270, 276, 277, 281, 284, 285, 288, 289, 295, 297, 306, 318, 330, 331, 333–341, 344–346
- norm of a field extension, 70
- normalized trace, 94
- NZC condition, 322–325, 328, 329
- Ohm's law, 215
- operator
 - adjoint, 6
 - polar decomposition of a linear operator, 7
 - unitary, 6
- orientation, 259

- orthogonal, 191
- orthogonal polynomials, 102
- orthogonal projection, 192
- orthogonality relations
 - dual orthogonality relations for matrix coefficients, 12
 - for characters, 14
 - for matrix coefficients, 11
 - for spherical functions, 22
 - for spherical functions of a multiplicity-free triple, 68
- outer tensor product of representations, 16
- parabolic representation of $GL(2, \mathbb{F}_q)$, 69
- partially balanced block design, 195, 240
- path in a finite graph, 27
- path metric, 204
- peak, 154
- periodic data, 276, 284, 285, 303, 304, 331, 338
- periodic point representation, 383–386, 394
- permutation representation, 19
 - for a not necessarily transitive action, 24
 - of S_n , 9
- Perron–Frobenius theory, 223, 331, 343
- Peter–Weyl theorem, 13
- Petersen graph, 40, 203, 205
- Picard group, 221
- point mass, 96
- points, 176, 246
- Poisson distribution, 97, 136
- polar decomposition of a linear operator, 7
- Pontryagin duality, 17
- positive equivalence, 321–326, 328–330
- positive semidefinite, 192, 208
- positive-definite function, 14
- primitive graph, 40
- primitive matrix, 280, 331
- principal
 - additive character of $\mathbb{F}_q$, 72
 - multiplicative character of $\mathbb{F}_q$, 73
- probability distribution, 47
- product state, 148
- projective plane, 194
- projective module, 353
- proper colouring, 256
- protein diffusion, 179
- quantum component, 107
- quantum decomposition, 107
- queen-bee design, 184, 242
- random variable, 93
- random walk, 222
- randomization, 181, 184
- Rayleigh principle, 210
- regular, 212
 - degree of a regular graph, 27
 - distance-regular graph, 30
 - strongly regular graph, 38
- regular graph, 27, 118, 204
- replication, 184
- representation, 5
 - character, 12
 - commutant, 10
 - commutant of two representations, 10
 - conjugate, 7
 - cuspidal representation of $GL(2, \mathbb{F}_q)$, 69, 79
 - dimension, 5
 - direct sum, 7
 - equivalence, 6
 - faithful, 10
 - induced, 56
 - inflation, 58
 - internal tensor product, 16
 - intertwiner of two representations, 10
 - irreducible, 5
 - Jacquet module, 78
 - left regular, 8
 - matrix coefficient, 11
 - multiplicity, 13
 - multiplicity-free, 20
 - outer tensor product, 16
 - parabolic representation of $GL(2, \mathbb{F}_q)$, 69
 - permutation, 19
 - permutation representation for a not necessarily transitive action, 24
 - permutation representation of S_n , 9
 - sign representation of S_n , 9
 - spherical, 23
 - subrepresentation, 5
 - unitary, 6
- residual, 183, 200
- residual sum of squares, 183, 200
- resistance, 214
- resistance distance, 216, 230
- resistance theorem, 217
- rome, 327
- root set, 379
- rotation map, 375
- Ryan’s theorem, 379, 380, 395
- sandpile group, 221
- Schur’s lemma, 10
- SE, 268

Subject Index

433

- semidirect product with an abelian group, 62
- semigroup, 212
- semiring, 268, 278
- shift equivalence, 266, 268, 269, 280, 288, 290, 292, 294, 298, 299, 310, 342, 346, 350, 360–367, 370, 397, 412, 413
- Shrikhande graph, 258
- sign representation of S_n , 9
- sign-gyration compatibility condition, 385–388, 399, 407
- signed incidence matrix, 212
- similarity of endomorphisms, 267
- simple automorphism, 377, 378, 383, 393, 395, 399, 402–404, 407, 408
- simple graph, 204
- simple random walk, 48
- spanning subgraph, 206
- spanning tree, 206, 234
- spectral decomposition, 192, 214
- spectral distribution, 95
- spherical Fourier transform, 25, 68
 - inversion formula, 68
 - Parseval identity, 68
- spherical function, 21
 - for a multiplicity-free triple, 67
 - on a distance-regular graph, 33
 - orthogonality relations, 22
- spherical representation, 23
- square lattice design, 194, 240
- SSE, 268
- stabilization, 347
- stabilized automorphism group, 390–393
- stabilized elementary equivalence, 315–318
- stabilized general linear group, 347
- stabilizer of a point w.r.t. a group action, 17
- stable algebra, 266, 267, 269, 293, 330, 331, 341
- standard normal distribution, 96, 115, 140
- star product graph, 150
- *-algebra, 92
- starfish, 249
- state, 92
- stationary distribution, 47
- statistical model, 181, 187, 201
- Steinberg group, 356
- Steiner triple system, 251
- Stieltjes inversion formula, 109
- Stieltjes transform, 109
- strong shift equivalence, 269, 271, 278, 280, 281, 292, 342, 346, 350, 355, 360–367, 370, 381, 382, 386, 387, 397, 399–404, 407, 408, 410, 412
- strongly regular graph, 38, 196, 204, 224, 258
- sub-representation, 5
- support, 96
- Suslov, Sergei K., 35
- Sylvester designs, 247
- Sylvester graph, 247, 248
- symmetric
 - association scheme, 42
 - difference of two sets, 40
 - Gelfand pair, 20
 - group, 9
 - weakly symmetric Gelfand pair, 20
- table of differences, 193
- tensor product
 - internal tensor product of representations, 16
 - of linear operators, 16
 - of vector spaces, 16
 - outer tensor product of representations, 16
- three-term recurrence relation, 103
- totally cyclic orientation, 259
- trace
 - of a field extension, 70
 - of a linear operator, 12
- trace sequence, 276, 277, 285, 294
- tracial state, 119
- transition matrix, 222
- treatments, 177
- tree, 206
- Triangle Identities, 401
- triangular graph, 40
- Turán graph, 261
- Tutte polynomial, 257
- uniform distribution, 47
- unipotent subgroup of $GL(2, \mathbb{F}_q)$, 69, 75
- unital, 92
- unitary
 - operator, 6
 - representation, 6
- upper bound lemma, 51
- vacuum spectral distribution, 102
- vacuum state, 102, 120
- valency, 204
- variance, 181, 199, 201, 230
- variance-balanced design, 251, 262
- variance-covariance matrix, 198
- vector state, 94
- von Neumann inverse, 212

Wagoner’s strong shift equivalence complex, 399–401, 403	weighted graph, 204
washing machines, 180	Wigner semi-circle law, 112, 116, 127, 132
weak convergence, 97	Williams’ conjecture, 280, 281, 288, 291, 346, 362, 373, 400, 405, 408, 412
weakly symmetric Gelfand pair, 20	zero extension, 293, 306, 369, 371, 372
weighted clique, 255	zeta function, 284, 285, 360