

Subject Index

- Algorithm, 2–3, 5–6, xiii, 22, 33, 79–80, 82, 132, 139–140, 145, 148, 186, 264, 275–276, 278
- derandomization, xiii
 - deterministic, 80, 284
 - greedy, 22, 32, 36, 38
 - Monte Carlo, 148
 - nonadaptive or on-line, 264
 - primality testing, 148
 - probabilistic or randomized, 3, 33, 36, 38, 79–80, 148, 275, 281, 289
- Rabin, 148
- Antichain, 219–220
- Arboricity
- dilinear, 75
 - linear
 - conjecture, 74–76
 - of a graph, 74
- Automorphism, 52, 157, 163
- BFS, 183, 186–187, 191
- Binomial
- distribution, 37–38, 77, 117, 210, 242, 257, 309, 314
 - random variable, 77, 117, 129, 210, 242, 246
- Block design, 56
- Brun’s sieve, 124–125
- Chain, 220
- rigid, 172–174
- Chromatic number, 41, 98, 101, 116, 136, 166, 271, 320, 324–325
- Circuit, 177, 205–207, 210–213, 215, 217, 325
- binary, 206–207, 214, 218
 - Boolean, 218
 - bounded-depth, 207, 211, 218
 - complexity, xiii, 205–207, 214
 - monotone, 214–215
 - subcircuit, 210
- Clique, 206, 214
- function, 206, 214
 - in a graph, 49–50, 53–54, 96, 101–102, 114, 140
 - number, 53, 104, 164–166
- Code
- binary BCH, 281
- Coding scheme, 256–257
- Coloring, 1–4, 7–8, 17–19, 27–29, 70–71, 74, 76–77, 80, 82, 103, 136, 216, 221–226, 230, 264, 275–276, 280–282, 290
- hypergraph, 79
 - random, 2–4, 19, 28, 32, 71–72, 76, 83, 222, 250
- Compactness, 71, 74
- Conjecture
- Danzer and Grünbaum, 238
 - Daykin and Erdős, 10
 - Erdős, 286, 325
 - Erdős and Hanani, 39, 56, 326

- Erdős and Szekeres, 326
 Erdős and Turán, 294
 Hadamard, 231
 Heilbronn, 30
 linear arboricity, 74–76
 Minc, 24, 63
 Ramanujan, 145
 Rival and Sands, 93
 Simonovits and Sós, 271
 Szele, 16, 63
 Convex body, 31, 110–112, 237, 241, 244, 252
 Covariance, 44, 46
 Covering, 56
 number, 56
 of a graph, 74
 of a hypergraph, 56–57, 60
 of \mathbb{R}^d , 73–74
 decomposable, 73
 non decomposable, 73
 Crossing number, 285–286
 Cut, 6
 Cycle, 41
 Density
 of a graph, 50, 52
 of a set, 325
 of linear expanders, 143
 of \mathbb{R}^d packing, 253
 Dependency, 126
 digraph, 68–69, 72, 75, 77–78, 133
 graph, 72, 80
 superdependency digraph, 134
 Deviation
 large, 45, 99, 127, 129, 131, 134, 307, 313
 inequality, 99
 standard, 43–44, 77, 117, 134, 223, 243
 Discrepancy, xiii, 221–222, 231, 248,
 250–251, 264
 of a set, 222
 hereditary, 226–228
 linear, 226–227
 Disjoint
 cliques, 101
 family, 73, 127
 maximal, 127
 pairs, 10
 pairwise, 9, 13, 75, 82
 Distribution, 4, 17, 21, 47, 91, 98–100, 114,
 162, 167, 183
 binomial, 37–38, 77, 117, 210, 242, 257,
 309, 314
 normal, 21, 44, 46–47, 107, 231, 309, 311,
 313, 316, 318–319, 324
 Poisson, 37–38, 119, 128, 130, 133, 182,
 313–314
 uniform, 9, 61, 71, 75–76, 78, 83, 110, 147,
 217, 237, 239, 241, 249
 Dominant component, 181
 Dominating set, 4–6, 175
 Ecological limitation, 188, 190, 193
 Edge connectivity, 6, 92
 Fhrenfeucht game, 168
 Eigenvalue, 143
 of a graph, 149
 of a matrix, 145
 of a regular graph, 144–145, 147–148
 of a symmetric matrix, 143–144, 146–147,
 149
 Eigenvector
 of a symmetric matrix, 144, 146–147
 Entropy, 223–224, 226, 255, 266, 268, 272
 binary, 266
 conditional, 266
 function, 136, 256, 266
 of a random variable, 266
 ϵ -net, 243–245
 ϵ -sample, 244–245, 248, 280
 Euclidean
 distance, 111
 norm, 19, 23, 61, 229
 space, 73, 238, 240, 244, 270
 Expander, 143–145, 156
 explicit construction, 143, 149
 linear, 143
 density, 143
 Expectation, xiii, 18–19, 23, 35, 43, 47, 61, 77,
 90, 97, 100, 106, 117, 153, 210, 246,
 296, 308, 321–322
 conditional, 97–99, 106–107, 259, 322
 linearity of, 4–5, 15, 18, 21, 24, 28–29, 31,
 38, 45, 49, 51, 58, 107, 109, 126, 162,
 178, 219, 223, 235, 259, 261, 274, 276,
 304, 322
 Explicit construction, 139–140, 143, 145, 259,
 284, 322
 expander, 149
 linear expander, 143
 Ramsey graph, 140
 tournament, 4, 143
 Forest, 74, 271
 linear, 74
 directed, 75–77
 star, 271
 Function
 Boolean, 120, 205–208, 211, 214, 217, 241
 Galton–Watson process, 182–184
 Giant component, xiv, 181, 191–192, 194,
 197–199
 Graph
 balanced, 50–52, 163
 strictly, 50, 52, 163–164
 Cayley, 145
 explicit construction, 143

- complexity, 180
 girth, 41–42, 76–77, 324
 directed, 75–77
 independent set, 29, 39, 41, 75–76, 81–82, 95, 130, 136, 140, 167, 177, 321–322, 324
 planar, 85, 92, 285
 quasirandom, 149–150, 155
 Ramsey
 explicit construction, 140
 random, 161
- Group**
 abelian, 9–10
 code, 257
 cyclic, 9
 factor, 145
 matrices, 143, 145
 symmetric, 99
- Hamiltonian**
 cycle, 23, 63, 65
 graph, 85, 92
 path, 16, 23, 63, 65, 248–250
- Hamming metric, 108, 110, 224, 257
- Hereditary graph property, 300–301
- Hypergraph**, 7, 39, 59, 70, 73, 115
 covering, 56–57, 60
 induced, 57, 60
 property B , 7, 32, 35, 70, 324
 regular, 70
 subhypergraph, 73
 two-coloring, 79
 uniform, 7, 11, 23, 32, 36, 39, 56–57, 61
- Inclusion-exclusion, 124–125
- Independent set**
 in an Euclidean space, 240
 in a graph, 29, 39, 41, 75–76, 81–82, 95, 130, 136, 140, 167, 177, 321–322, 324
- Inequality**, 8, 11, 28, 33, 47, 64, 70, 74, 77, 80, 86–87, 89–92, 94, 99, 103, 106, 108, 111–112, 121–123, 133, 143–144, 146–147, 156–157, 167, 209, 216–217, 231, 239, 244, 246–247, 274, 276, 278–279, 307–308, 310–312, 315
 Azuma, 99–100, 102, 104, 108, 113–114
 Bonferroni, 125
 Cauchy–Schwarz, 142, 146–147, 155
 Chebyshev, 43–44, 46, 48, 55, 58, 60, 117, 121, 246
 correlation, xiii, 85, 90, 92, 122
 FKG, 85, 89–94, 208
 Han, 272
 Hölder, 112
 isoperimetric, 99, 108
 Janson, 91, 119–120, 125–126, 128, 134, 163–164, 166
 extended, 115, 121, 166
- Jensen, 266–267, 296, 311
 Kraft, 12
 Kraft–McMillan, 12
 large deviation, 99
 Markov, 308, 310
 martingale, xiii, 99, 105, 115
 Talagrand, 109–110, 113–114
- Join, 87–88, 93
- Join-irreducible, 88
- Laplace transform, 121, 134
- Latin transversal, 78
- Lattice, 31, 87, 93, 253
 distributive, 87–89, 93
 sublattice, 88
- Lemma**
 Borel–Cantelli, 130–131, 133
 Kleitman, 90
 Lovász Local Lemma, 2, 28–29, 67–74, 76–79, 82–83, 133
 removal, 302
 switching, 207
 Szemerédi’s Regularity Lemma, xiv, 294–295, 298, 300–302
- Linear extensions, 92
 of partially ordered set, 92, 94
- Lipschitz**
 condition, 100–101, 103–105, 107–108
 function, 113
- Log-supermodular, 89–91, 94
- Lookahead strategy, 173
- Martingale**, 2, xiii, 97–104, 107–108, 113–114
 Doob process, 98
 edge exposure, 98–101
 flip a coin, 99
 inequality, xiii, 99, 105, 115
 vertex exposure, 99–100, 103
- Matrix**
 adjacency
 of a graph, 143–145, 147, 149, 151
 of a tournament, 64
 Hadamard, 229–231
 Vandermonde, 282
- Mayavati, 37
- Mean**, 37–38, 44, 46, 100, 107, 109, 114–115, 119, 130–131, 133–134, 182, 186–187, 189, 191, 193, 201, 203–204, 223, 309, 313–314, 319
 geometric, 24, 26
- Meet, 87–88, 93
- Monochromatic**, 2–3, 7–8, 18–19, 23, 28, 32–35, 70, 72, 74, 80–81, 221, 275–276, 280–281, 284, 324–325
- NC (polylogarithmic parallel time)**, 280, 282
- Normal**
 distribution, 21, 44, 46–47, 107, 231, 311, 313, 324

- NP (nondeterministic polynomial time),
206–207, 214, 217, 290
- P (polynomial time), 2, 207
- Packing, 31–32, 36, 39, 56, 252
constant, 31, 252
greedy, 36
number, 39, 56
of \mathbb{R}^d , 253
random, 36
- Parity function, 205, 210–211, 213, 217–218
- Partially ordered set, 87, 92–94
- Permanent, 24–25, 63–64
- Pessimistic estimators, 277
- Phase transition, xiv, 179, 190, 197
- Primality testing algorithm, 148
- Prime, 9, 23, 31, 44–47, 62, 77, 141, 145,
148–149, 155, 211, 324
- Projective plane, 273
- Property of graphs, 92
- Property tester, 289–290, 298
- Pythagoras, 22, 238
- Quadratic residue character, 141
- Quasirandom, 140
- Ramsey, 328
function, 325
graph, 140
explicit construction, 140
number, 1, 11, 27–28, 39, 71–72, 322, 324
theory, 18, 328
- Random variables, 4–5, 11, 15, 20–21, 23,
43–44, 46, 61, 97, 105, 107, 111, 113,
119, 121, 131–132, 153, 182, 219, 262,
265–266, 268–270, 272, 281–284,
307–308, 314, 317–318, 320–321
almost d -wise independence, 284
binomial, 77, 117, 129, 210, 242, 246
decomposition, 15, 44, 80
 d -wise independence, 280, 284
entropy, 266
indicator, 5, 15–16, 28–29, 44, 48, 51, 53,
58–59, 95, 120, 124, 126, 178, 219,
222, 224, 242, 259–260, 273, 312–313
- Random walk, 97, 149, 157–158, 184, 201
- Range space, 243–245, 248, 250–251
- Recoloring, 32
- Rödl Nibble, 56, 109
- Rooted graph, 116, 171
- Second moment method, 43–44, 49, 55–56
- Siena, 37
- Sorting network, 143
- Sum-free, 9–10
- Tactical configuration, 56
- Theorem
Erdős–Ko–Rado, 13
Ramsey, 323, 325
Sperner, 220
Tikhonov, 71
Turán, 29–30, 95–96, 302–303
XYZ, 93
- Threshold function, 49–52, 125–126, 129,
135, 163, 168, 174–175
- Tournament, 3–4, 12, 16, 63–65, 67, 140–141,
143
explicit construction, 4, 143
quadratic residue tournament, 140–141, 155
- Variance, xiii, 20, 43–44, 46, 58, 61, 105–107,
153, 193, 210, 223, 246, 309, 311,
313–314, 319
- VC-dimension, 243–245, 247–249
- Vector
imbalanced, 231
- Vertex transitive graph, 157–158
- Walk, 146–149, 151
random, 97, 149, 157–158, 184, 201
- Witness, 148–149
- Zero-one laws, 167–169, 171, 175