

Index

- ϵ -moves, 703
- #P-completeness, 476, 548
- 0/1 knapsack problem, 497
- 2/3 tree, 443
- 3-SAT, 368

- above-below test, 475, 624
- abracadabra, 686
- abstract graph type, 454
- academic institutions – licensing, 713
- acceptance-rejection method, 488
- Ackerman function, 459
- acyclic graph, 199
- acyclic subgraph, 618
- Ada, 439
- adaptive compression algorithms, 695
- Adaptive Simulated Annealing (ASA), 481
- addition, 493
- adjacency list, 204, 452
- adjacency matrix, 203, 452
- adjacent swaps, 520
- Advanced Encryption Standard, 697
- advice – caveat, 438
- aesthetically pleasing drawings, 574
- aggregate range queries, 642
- agrep, 691
- Aho–Corasick algorithm, 686
- air travel pricing, 125
- airline distance metric, 393
- airline scheduling, 482, 682

- algorist, 22
- Algorist Technologies—consulting, 718
- algorithm design, 429
- algorithmic resources, 713
- aligning DNA sequences, 706
- alignment costs, 689
- all-pairs shortest path, 261, 452, 556
- alpha-beta pruning, 160, 510
- alpha-shapes, 628
- amortized analysis, 444
- analog channel, 523
- ancestor, 18
- angular resolution, 574
- animation – motion planning, 667
- animation – sorting, 509
- approximate nearest-neighbor search, 463, 639
- approximate string matching, 314, 687, 688, 706
- approximate string matching – related problems, 687, 708
- approximation algorithms, 389, 470
- approximation scheme, 500, 597
- arbitrary-precision arithmetic, 493
- arbitrary-precision arithmetic – geometry, 623
- arbitrary-precision arithmetic – related problems, 533
- architectural models, 648
- area computations – applications, 665
- area computations – triangles, 624

- area minimization, 574
- arm, robot, 669
- around the world game, 600
- Arrange, 646, 673
- arrangement, 18, 670
- arrangement of objects, 517
- arrangements of lines, 671
- array, 441
- art gallery problems, 660
- articulation vertex, 225, 229, 568
- artists steal, 713
- ASA, 481
- ASCII, 442
- aspect ratio, 575
- assembly language, 494, 503
- assignment problem, 562
- associative operation, 473
- asymmetric longest path problem, 600
- asymmetric TSPs, 710
- asymptotic analysis, 31
- atom smashing, 524
- attitude of the algorithm designer, 429
- attribute, 458
- attribute – graph, 453
- augmenting path, 563, 573
- automorphisms, 610
- average, 514
- average-case analysis, 444
- average-case complexity, 33
- AVL tree, 443
- Avogadro's number, 600
- awk, 685
- axis-oriented rectangles, 641, 651
- axis-parallel planes, 461

- B-tree, 443, 508, 512
- back edge, 222
- back substitution, 468
- backpacker, 497
- backtracking, 281, 519, 547, 587, 599, 605, 611, 680, 683
- backtracking – applications, 499, 615
- backtracking – bandwidth problem, 471
- balanced search tree, 86, 440, 443
- balltrees, 638
- banded systems, 468, 470
- bandersnatch problem, 356
- bandwidth, 468, 517
- bandwidth – matrix, 473
- bandwidth reduction, 470
- bandwidth reduction – related problems, 620
- bar codes, 326
- base – arithmetic, 494
- base – conversion, 494
- base of logarithm, 53
- Bellman–Ford algorithm, 555, 557
- Berge's theorem, 563
- best-case complexity, 33
- best-first search, 299
- BFS, 221
- Bible – searching the, 686
- bibliographic databases, 718
- biconnected components, 544
- biconnected graph, 229
- biconnected graphs, 474, 568, 599
- Big Oh notation, 34, 62
- bijection, 522
- bin packing, 652
- bin packing – applications, 536, 576
- bin packing – knapsack problem, 499
- bin packing – related problems, 500, 536
- binary heap, 446
- binary representation – subsets, 522
- binary search, 49, 148, 510
- binary search – applications, 450, 707
- binary search – counting occurrences, 149
- binary search – one-sided, 149, 512
- binary search tree, 81, 443, 446, 646
- binary search tree – applications, 83

- binary search tree – computational experience, 100
- binomial coefficients, 312
- biocomputing, 600
- biology, 99
- bipartite graph, 267, 604
- bipartite graph recognition, 219
- bipartite incidence structures, 453
- bipartite matching, 267, 447, 483, 562, 604
- bipartite matching – applications, 275, 534
- birthday paradox, 184
- bisection method, 150
- bit representation of graphs, 455
- bit vector, 454, 457, 507, 518
- bit vector – applications, 24, 490
- Bitcoin, 700
- blackmail graph, 263
- blind man’s algorithm, 669
- block – set partition, 526
- blossoms, 563
- board evaluation function, 480
- bookshelves, 333
- Boolean logic minimization, 591, 678
- Boolean matrix multiplication, 474
- Boost graph library, 207
- borrowing, 494
- Boruvka’s algorithm, 552
- boss’s delight, 6
- bottleneck spanning tree, 254
- boundaries, 19
- boundary conditions, dynamic programming, 322
- bounded-height priority queue, 446
- bounding boxes, 650
- Boyer–Moore algorithm, 686
- brainstorming, 429
- branch and bound search, 299
- branch-and-bound search, 588, 595, 615
- breadth-first search, 221, 542, 551, 555
- breadth-first search (BFS), 214
- breadth-first search – applications, 471
- bridge, 568
- bridge edge, 229
- bridges of Königsberg, 567
- Brook’s theorem, 607
- brush fire, 656
- brute-force search, 486
- bubblesort, 506
- bucket sort, 507
- bucketing techniques, 136, 442, 647
- bucketing techniques – graphics, 275
- budget, fixed, 497
- built-in random number generator, 487
- buying fixed lots, 678
- C language, 491, 503, 557, 563, 570, 573, 588, 606, 613, 628, 632, 636, 646, 651, 673, 710
- C sorting library, 114
- C++, 439, 444, 447, 454, 458, 544, 548, 552, 557, 564, 567, 570, 582, 625, 639, 643, 646, 650
- C++ templates, 714
- cache, 31
- cache-oblivious algorithms, 443
- Caesar shifts, 697
- calendrical calculations, 532
- call graph, 569
- canonical order, 456, 521, 677
- canonicalization, 97
- canonically labeled graphs, 613
- CAP3, 710
- Carmichael numbers, 492
- cars and tanks, 666
- cartoons, 19
- casino analysis, 33
- casino poker, 486
- catalog website, 438
- Catch-22 situation, 535
- caveat, 438
- center vertex, 555, 557, 579

- CGAL, 621, 650, 714
- chain of matrices, 473
- chaining, 93
- characters, 19
- checksum, 699
- chess program, 478, 514
- chessboard coverage, 296
- Chinese calendar, 532
- Chinese postman problem, 565
- Chinese remainder theorem, 495
- Christofides heuristic, 597
- chromatic index, 608
- chromatic number, 604
- chromatic polynomials, 606
- cipher, 697
- circle, 488
- circuit analysis, 467
- circuit board assembly, 5
- circuit board placement –
 - simulated annealing, 411
- circuit layout, 470
- circuit testing, 281
- circular embeddings, 576
- classification, 615
- classification – nearest-neighbor,
 - 637
- clauses, 538
- clique, 586
- clique – definition, 366
- clique – hardness proof, 366
- clique – related problems, 590
- clock, 487
- closest point, 637
- closest-pair heuristic, 7
- closest-pair problem, 110, 639
- closure, 559
- clothing – manufacturing, 654
- cloudy days, 666
- cluster, 18
- cluster identification, 542, 549
- clustered access, 512
- clustering, 256, 437, 586
- co-NP, 492
- co-planar points, 475
- coding theory, 589
- cofactor method, 476
- coin flip, 522
- collapsing dense subgraphs, 601
- Collected Algorithms of the ACM,
 - 499, 715
- collection, 18
- color interchange, 605
- coloring graphs, 604
- combinatorial generation, 527
- combinatorial generation
 - algorithms, 717
- combinatorial geometry, 672
- combinatorial problems, 505
- Combinatorica, 455, 505, 520, 523,
 - 527, 531, 552, 561, 567,
 - 580, 606, 708, 716
- commercial implementations, 483
- committee, 18
- committee – congressional, 453
- common substrings, 706
- communication in circuits, 602
- communications networks, 554, 571
- compaction, 693
- comparison function, 115
- comparisons – minimizing, 516
- compiler, 487
- compiler construction, 702
- compiler optimization, 342, 604
- compiler optimization –
 - performance, 56
- complement, 452
- complement graph, 589
- completion time – minimum, 535
- complex numbers, 425
- complexity classes, 492
- composite integer, 490
- compositions, 527
- compression, 693
- compression – image, 501
- computational biology, 99
- computational complexity, 612
- computational geometry, 621
- computational number theory, 492,
 - 496
- computer algebra system, 479, 493
- computer graphics, 472

- computer graphics – applications, 90
- computer graphics – rendering, 661
- computer vision, 655
- concatenation – string, 710
- concavities, 628
- concavity elimination, 661
- conditional probability, 174, 175
- configuration space, 669
- configurations, 19
- conjugate gradient methods, 480
- conjunctive normal form (CNF), 538
- connected component, 218, 225
- connected components, 219, 457, 524, 542
- connected components – related problems, 561, 570
- connectivity, 225, 544, 568
- consensus sequences, 706
- consistent schedule, 534
- constrained Delaunay triangulation, 631
- constrained optimization, 478, 484, 485, 539
- constraint elimination, 618
- consulting services, 432, 718
- container, 75, 457
- context-free grammars, 687
- Contig Assembly Program, 710
- control systems – minimization, 702
- convex decomposition, 641, 658
- convex hull, 111, 626, 635
- convex hull – related problems, 597, 663
- convex polygons, 675
- convex polygons – intersection, 649
- convex region, 483
- convolution – polygon, 675
- convolution – sequences, 501
- cookbook, 438
- cooling schedules, 407
- coordinate transformations, 472
- copying a graph, 212
- corporate ladder, 579
- correctness – algorithm, 4
- correlation function, 502
- counterexample construction, 8
- counting edges and vertices, 212
- counting Eulerian cycles, 567
- counting integer partitions, 525
- counting linear extensions, 547
- counting matchings, 476
- counting paths, 473, 612
- counting set partitions, 526
- counting spanning trees, 553
- covering polygons with convex pieces, 659
- covering set elements, 678
- Cramer's rule, 476
- CRC, 699
- critical path method, 536
- crossing number, 582
- crossings, 574
- cryptography, 697
- cryptography – keys, 486
- cryptography – related problems, 492, 496, 696
- CS, 573
- CSA, 563, 570
- cubic regions, 461
- curve fitting, 484
- cut set, 569, 601
- Cuthill–McKee algorithm, 471
- cutting plane methods, 483, 595
- cutting stock problem, 652
- CWEB, 716
- cycle – shortest, 556
- cycle breaking, 619
- cycle detection, 222, 544
- cycle in graph, 199
- cycle length, 488
- cycle structure of permutations, 520
- cyclic-redundancy check (CRC), 699
- DAG, 200, 231, 397
- DAG – longest path in, 599
- DAG – shortest path in, 556
- data compression, 327

- Data Encryption Standard (DES), 697
- data filtering, 514
- data records, 18
- data structures, 69, 439
- data transmission, 693
- data validation, 699
- database algorithms, 685
- database application, 641
- database query optimization, 561
- Davenport–Schinzel sequences, 459, 670, 673
- Davis–Putnam procedure, 538
- day of the week calculation, 532
- de Bruijn sequence, 567, 599
- De Morgan’s laws, 538
- deadlock, 544
- debugging graph algorithms, 542
- debugging parallel programs, 160
- debugging randomized algorithms, 487
- debugging tools, 578
- decimal arithmetic, 494
- decompose space, 460
- decomposing polygons, 630
- deconvolution, 501
- decrease-key, 447
- decreasing subsequence, 323
- decryption, 697
- defenestrate, 511
- degeneracy, 622
- degeneracy testing, 671
- degenerate configuration, 475
- degenerate system of equations, 467
- degree sequence, 530
- degree, vertex, 202, 612
- degrees of freedom, 668
- Delaunay triangulation, 631, 635, 639
- Delaunay triangulation – applications, 551
- deletion from binary search tree, 85
- deletions – text, 688
- deliveries and pickups, 565
- delivery routing, 534
- Democrat/Republican identification, 637
- dense graphs, 202, 452, 599
- dense subgraph, 587
- densest sphere packing, 654
- depth-first search, 224, 230, 449, 452, 542, 546, 551, 559, 568, 599
- depth-first search – applications, 394, 566, 582, 596, 605, 706
- depth-first search – backtracking, 282
- dequeue, 76
- derangement, 194, 303
- derivatives – automata, 704
- derivatives – calculus, 479
- DES, 697
- descendant, 18
- design process, 429
- design rule checking, 648
- determinant, 467
- determinant – related problems, 469
- determinants and permanents, 475
- deterministic finite automata (DFA), 702
- DFA, 702
- DFS, 224
- diameter of a graph, 557
- diameter of a point set, 626
- dictionaries – related problems, 509, 513
- dictionary, 76, 440, 445, 457
- dictionary – applications, 92
- dictionary – related problems, 447
- dictionary – searching, 510
- diff – how it works, 688
- digital geometry, 656
- digital signatures, 700
- digitized images, 554
- Dijkstra’s algorithm, 258, 302, 555, 557
- DIMACS, 444, 463
- DIMACS Implementation Challenge, 564, 573, 588,

- 606
- Dinic's algorithm, 573
- directed acyclic graph (DAG), 200, 535, 546, 618
- directed cycle, 546
- directed graph, 198, 201
- directed graphs – automata, 702
- directory file structures, 578
- disclaimer, 438
- discrete event simulation, 486
- discrete Fourier transform, 501, 502
- discrete mathematics software, 716
- discussion section, 437
- disjoint paths, 569
- disjoint set union, 459
- disjoint subsets, 457
- disjunctive normal form (DNF), 538, 678
- disk access, 443
- disk drives, 693, 699
- dispatching emergency vehicles, 637, 644
- dispersion problems, 589
- distance graph, 595
- distance metrics, 257
- distinguishable elements, 519
- distribution sort, 136, 507
- divide and conquer, 129, 147, 495, 502, 601
- division, 490, 493
- DNA, 99
- DNA sequence comparisons, 706
- DNA sequencing, 275, 414, 709
- dominance orderings, 18, 642
- DOS file names, 275
- double-precision arithmetic, 465, 493, 623
- Douglas-Puecker algorithm, 662
- drawing graphs – related problems, 580
- drawing graphs nicely, 574
- drawing puzzles, 565
- drawing trees, 578
- drawing trees – related problems, 577, 583
- driving time minimization, 594
- drug discovery, 667
- DSATUR, 606
- dual graph, 90, 211
- duality, 501, 627
- duality transformations, 672
- duplicate elimination, 442
- duplicate elimination – graphs, 610
- duplicate elimination – permutations, 518
- duplicate keys, 506
- dynamic convex hulls, 629
- dynamic data structures, 639, 647
- dynamic graph algorithms, 455
- dynamic programming, 307, 474, 498, 556, 599, 633, 706
- dynamic programming – applications, 659, 688
- dynamic programming – initialization, 689
- dynamic programming – shortest paths, 267
- dynamic programming – space efficiency, 324
- dynamic programming traceback, 319
- eccentricity of a graph, 557
- economics – applications to, 620
- edge, 198
- edge and vertex connectivity, 568
- edge chromatic number, 608
- edge coloring, 605, 608
- edge coloring – applications, 534
- edge coloring – related problems, 536, 607
- edge connectivity, 229
- edge cover, 592, 679
- edge disjoint paths, 569
- edge flipping operation, 530
- edge labeled graphs, 702
- edge length, 574
- edge tour, 599
- edge/vertex connectivity – related problems, 545, 573, 603
- edit distance, 314, 706
- Edmond's algorithm, 564

- efficiency of algorithms, 4
- electrical circuits, 197
- electrical engineers, 501
- electronic circuit analysis, 467
- element uniqueness problem, 110, 516
- elimination ordering, 581
- ellipsoid algorithm, 485
- elliptic-curve method, 492
- embedded graph, 200
- embeddings – planar, 581
- empirical results, 561, 606
- empirical results – heuristics, 617
- empirical results – string matching, 687
- employees to jobs – matching, 562
- empty circle – largest, 634
- empty rectangle, 654
- enclosing boxes, 650
- enclosing disk, 668
- enclosing rectangle, 654
- encryption, 697
- energy function, 478
- energy minimization, 576, 617
- English language, 12, 511
- English to French, 512
- enqueue, 76
- epsilon-moves, 703
- equilateral triangle, 616
- equivalence classes, 612
- equivalence classes – automata states, 703
- Erdős-Gallai conditions, 531
- Erdős-Rényi graphs, 529
- error, 465
- estimating closure sizes, 561
- ethnic groups in Congress, 679
- Euclid's algorithm, 496
- Euclidean minimum spanning tree, 596
- Euclidean traveling salesman, 393
- Euler's formula, 581
- Eulerian cycle, 565
- Eulerian cycle – applications, 534
- Eulerian cycle – line graphs, 609
- Eulerian cycle – related problems, 600
- Eulerian path, 565
- evaluation function, 478
- even-degree vertices, 566
- even-length cycles, 563
- event, 173
- event queue, 650
- evolutionary tree, 615
- exact cover problem, 683
- exact string matching, 688
- exam scheduling, 608
- exercises, 27, 59, 103, 140, 166, 193, 235, 276, 303, 345, 383, 426
- exhaustive search, 24, 517
- exhaustive search – application, 8
- exhaustive search – empirical results, 597
- exhaustive search – subsets, 521
- expanded obstacles approach, 668
- expander graphs, 716
- expected time, 33
- expected value, 173
- expected-time, linear, 515
- experiment, 172
- experimental analysis – set cover, 681
- experimental graph theory, 528
- explicit graph, 200
- exponential time, 316
- exponential-time algorithms, 281, 585
- exponentiation, 50, 495
- external memory, 512
- external-memory sorting, 506, 507
- facets, 627
- facility location, 589, 634
- factorial function, 153
- factoring, 423
- factoring and primality testing, 490
- factoring and primality testing – related problems, 496, 701
- factory location, 634
- family tree, 18, 578

- fan out minimization for networks, 551
- Fary's theorem, 583
- fast Fourier transform (FFT), 502
- fat cells, 461
- fattening polygons, 674
- feature sets, 666
- Federal Sentencing Guidelines, 51
- feedback edge/vertex set, 547, 618
- feedback edge/vertex set – related problems, 548
- Fermat, 617
- Fermat's theorem, 491
- Ferrer's diagram, 525
- FFT, 422, 496, 502
- FFTPACK, 503
- fgrep, 686
- Fibonacci heap, 447, 552, 557
- Fibonacci numbers, 153, 308
- FIFO, 75
- FIFO queue, 215
- file difference comparison, 688
- file layout, 470
- filtering outlying elements, 514
- filtering signals, 501
- final examination, 698
- financial constraints, 497
- find operation, 458
- finite automata, 702
- finite automata minimization, 686
- finite element analysis, 632
- finite state machine minimization, 702
- firehouse, 637
- first-fit – decreasing, 653
- first-in, first-out (FIFO), 75
- fixed degree sequence graphs, 530
- fixed-parameter tractability, 620
- flat-earth model, 32
- Fleury's algorithm, 567
- flight crew scheduling, 682
- flight ticket pricing, 125
- floating-point arithmetic, 623
- Floyd's algorithm, 262, 556, 557, 559
- football program, 600
- football scheduling, 608
- Ford-Fulkerson algorithm, 270
- Fortran, 465, 469, 471, 473, 476, 499, 503, 520, 526, 531, 606, 654, 660, 715, 717
- Fortune's algorithm, 635
- four Russians algorithm, 474, 692, 708
- four-color problem, 528, 607
- Fourier transform, 422
- Fourier transform – applications, 662
- Fourier transform – multiplication, 495
- Fourier transform – related problems, 663
- fragment ordering, 275
- fraud – tax, 586
- free space, 670
- free trees, 578
- freedom to hang yourself, 429
- frequency distribution, 110
- frequency domain, 501
- friendship graph, 201, 586
- function interpolation, 630
- furniture moving, 667
- furthest-point insertion heuristic, 596
- furthest-site diagrams, 636
- future events, 445
- game-tree search, 510
- game-tree search – parallel, 160
- games directory, 490
- GAMS, 481, 715
- gaps between primes, 491
- garbage trucks, 565
- Gates, William, 514
- Gaussian distribution, 488, 502
- Gaussian elimination, 467, 470
- Genbank searching, 688
- generating graphs, 528
- generating partitions, 524
- generating partitions – related problems, 459, 520, 523
- generating permutations, 517

- generating permutations – related problems, 489, 523, 527, 531, 533
- generating subsets, 521
- generating subsets – applications, 23
- generating subsets – related problems, 459, 489, 520, 527
- genetic algorithms, 417, 481
- geographic information systems (GIS), 641
- geometric data structure, 98
- geometric degeneracy, 622
- geometric primitives – related problems, 477
- geometric shortest path, 555, 667
- geometric spanning tree, 551
- geometric Steiner tree, 614
- geometric traveling salesman problem, 5
- geometric TSP, 595
- GEOMPACK, 660
- gerrymandering, 658
- Gibbs–Poole–Stockmeyer algorithm, 471
- gift-wrapping algorithm, 627
- Gilbert and Pollak conjecture, 617
- girth, 556
- global optimization, 478
- Graham scan, 628
- Grail, 704
- graph, 197
- graph algorithms, 197, 446
- graph algorithms – bandwidth problem, 470
- graph complement, 452
- graph data structures, 98, 243, 452
- graph data structures – applications, 702
- graph data structures – Boost, 207
- graph data structures – LEDA, 207, 714
- graph databases, 453
- graph density, 452
- graph drawing – related problems, 583
- graph drawings – clutter, 560
- graph embedding, 453
- graph isomorphism, 517, 531, 610
- graph isomorphism – related problems, 531, 666
- graph partition, 454, 569, 601
- graph partition – related problems, 570
- graph theory, 197
- graph theory packages, 716
- graph traversal, 212
- GraphBase, 454, 530, 552, 564, 600, 620, 716
- graphic partitions, 531
- graphical enumeration, 531
- graphs, 18
- Gray code, 522, 523
- greatest common divisor (gcd), 359, 423, 493
- greedy heuristic, 91, 245, 343, 499, 590, 680, 683
- greedy heuristic – Huffman codes, 695
- greedy heuristic – minimum spanning trees, 549
- Gregorian calendar, 533
- grid embeddings, 582
- grid file, 645
- grid search, 480
- Grinch, The, 140
- group – automorphism, 610
- Grover’s algorithm, 420, 513
- growth rates, 37
- guarantees – importance of, 390
- guarding art galleries, 660
- Guide to Available Mathematical Software, 715
- gzip, 695
- H-index, 526
- hackerrank, 30, 67, 107, 146, 169, 195, 242, 280, 306, 353, 388, 428
- had-sex-with graph, 201

- half-space intersection, 627
- Hamiltonian cycle, 474, 561, 594, 598
- Hamiltonian cycle – applications, 534
- Hamiltonian cycle – counting, 477
- Hamiltonian cycle – hardness proof, 362
- Hamiltonian cycle – hypercube, 523
- Hamiltonian cycle – line graphs, 609
- Hamiltonian cycle – related problems, 567, 597
- Hamiltonian path, 551
- Hamiltonian path – applications, 90
- Hamming distance, 664
- hardness of approximation, 586
- hardware arithmetic, 494
- hardware design applications, 702
- hardware implementation, 503
- hash function, 442
- hash tables, 93, 442
- hash tables – computational experience, 100
- hash tables – size, 490
- Hausdorff distance, 665
- heap, 446
- heap construction, 153
- heapsort, 116, 506
- heard-of graph, 201
- heart-lung machine, 441
- heating ducts, 614
- Hebrew calendar, 532
- Hertel–Mehlhorn heuristic, 659
- heuristics, 399, 652
- heuristics – empirical results, 596
- hidden-surface elimination, 649
- hierarchical decomposition, 454, 461
- hierarchical drawings, 578
- hierarchical graph structures, 454, 455
- hierarchy, 18
- Hierholzer’s algorithm, 566
- high school algebra, 467
- high school cliques, 586
- high-precision arithmetic – related problems, 492, 503
- higher-dimensional data structures, 460
- higher-dimensional geometry, 627, 635, 638
- hill climbing, 479
- HIPR, 573
- historical objects, 532
- history, 438, 509
- history – cryptography, 701
- history – graph theory, 567
- hitting set, 679
- HIV virus, 417
- homeomorphism, 583
- horizon, 650
- Horner’s rule, 28, 442, 495
- How to Solve It, 433
- hub site, 595
- Huffman codes, 695
- human genome, 99
- Hungarian algorithm, 564
- hypercube, 161, 523
- hypergraph, 453, 455, 457
- hyperlinks, 529
- hyperplanes, 673
- hypertext layout, 470
- identical graphs, 610
- IEEE Data Compression Conference, 696
- image compression, 637, 661, 693, 694
- image data, 461
- image features, 666
- image filtering, 501
- image processing, 655
- image segmentation, 554
- image simplification, 662
- implementation challenges, 30, 67, 108, 146, 169, 195, 242, 280, 306, 353, 388, 428, 444, 463
- implementations, caveats, 438

- implicit binary tree, 446
- implicit graph, 200
- impress your friends algorithms, 533
- in-circle test, 625
- in-order traversal, 222
- inapproximability results, 681
- incidence matrices, 453
- inconsistent linear equations, 482
- increasing subsequences, 323, 707
- incremental algorithms, 575
- incremental change methods, 517
- incremental insertion algorithms – arrangements, 672
- incremental insertion algorithms – coloring, 605
- incremental insertion algorithms – graph drawing, 582
- incremental insertion algorithms – sorting, 124
- incremental insertion algorithms – suffix trees, 450
- incremental insertion algorithms – TSP, 596
- independence, 174
- independent set, 275, 589
- independent set – alternate formulations, 682
- independent set – hardness proof, 363
- independent set – related problems, 588, 593, 607, 684
- independent set – simulated annealing, 410
- index – how to use, 437
- index manipulation, 322
- induced subgraph, 587, 606
- induced subgraph isomorphism, 611
- induction and recursion, 15
- inequivalence of programs with assignments, 376
- information retrieval, 510
- information theory, 489
- input-output graphics, 437
- insertion into binary search tree, 84
- insertion sort, 3, 124, 506, 508
- insertions – text, 688
- inside–outside polygon, 644
- instance – definition, 3
- integer arithmetic, 623
- integer compositions, 527
- integer factorization, 612, 698
- integer partition, 498, 524, 530, 652
- integer programming, 483
- integer programming – applications, 499, 535
- integer programming – hardness proof, 371
- integer programming – related problems, 500
- integrality constraints, 483
- interfering tasks, 608
- interior-point methods, 483
- Internal Revenue Service (IRS), 586
- Internet, 486, 718
- interpolation search, 512
- intersection – halfspaces, 483
- intersection – set, 456
- intersection detection, 648
- intersection detection – applications, 665
- intersection detection – related problems, 625, 673
- intersection point, 467
- interview scheduling, 608
- invariant – graph, 612
- inverse Ackerman function, 459
- inverse Fourier transform, 501
- inverse matrix, 469, 475
- inverse operations, 518
- inversions, 475
- isomorphism, 531
- isomorphism – graph, 610
- isomorphism-complete, 613
- iterative methods – linear systems, 468
- JFLAP, 704
- jigsaw puzzle, 652
- job matching, 562

- job scheduling, 534
- job-shop scheduling, 536
- JPEG, 694
- Julian calendar, 533
- K_5 , 581
- $K_{3,3}$, 583
- k-optimal tours, 596
- k-subsets, 522, 527
- k-subsets – applications, 529
- Königsberg, 567
- Karatsuba’s algorithm, 495
- Karazanov’s algorithm, 573
- Karmarkar’s algorithm, 485
- kd-trees, 460, 638
- kd-trees – applications, 642
- kd-trees – related problems, 640, 643, 647
- Kepler conjecture, 654
- Kernighan–Lin heuristic, 596, 603
- key length, 697
- key search, 462
- Kirchhoff’s laws, 467
- knapsack, 483
- knapsack problem, 497, 521
- knapsack problem – applications, 55
- knapsack problem – related problems, 654
- Knuth–Morris–Pratt algorithm, 686
- Kolmogorov complexity, 489
- Kruskal’s algorithm, 248, 445, 458, 550, 552
- kth-order Voronoi diagrams, 636
- Kuratowski’s theorem, 583
- L_∞ metric, 257
- label placement, 576
- labeled graphs, 200, 528, 611
- labels, 19
- Lagrangian relaxation, 481
- language pattern matching, 611
- LAPACK, 469, 473
- large graphs – representation, 454
- largest element, 514
- last in, first out, 75
- layered printed circuit boards, 582
- LCA – least common ancestor, 451
- leap year, 533
- least common ancestor, 451
- least-squares curve fitting, 484
- leaves – tree, 530
- LEDA, 207, 444, 447, 454, 458, 544, 548, 552, 557, 561, 564, 567, 570, 582, 625, 628, 632, 636, 639, 643, 646, 650, 714
- leetcode, 30, 67, 107, 146, 168, 195, 242, 280, 306, 352, 388, 428
- left-right test, 475
- left-to-right ordering, 339
- Lempel–Ziv algorithms, 694, 695
- lexicographic order, 517, 521, 522, 525, 526
- lhs, 629
- libraries, 465
- licensing arrangements, 713
- LIFO, 75
- lifting-map construction, 629
- line arrangements, 671
- line graph, 609
- line intersection, 622, 649
- line segment intersection, 624
- line segment Voronoi diagram, 656
- line-point duality, 672
- linear algebra, 472, 475
- linear arrangement, 470
- linear congruential generator, 487
- linear constraint satisfaction, 671
- linear extension, 546
- linear interpolation search, 513
- linear partitioning, 333
- linear programming, 479, 482
- linear programming – models, 571
- linear programming – related problems, 481, 573
- linear programming – relaxation, 595
- linear programming – special cases, 571

- linear regression, 467
- linear-time graph algorithms, 455
- link distance, 662, 674
- linked lists vs. arrays, 76, 441
- LINPACK, 469, 473, 476
- literate program, 716
- little oh notation, 59
- local optima, 479
- locality of reference, 441, 511
- locations, 18
- logarithms, 49
- logic minimization, 678
- logic programming, 342
- long division, 495
- long keys, 507
- longest common prefix, 451
- longest common subsequence (LCS), 323
- longest common substring, 449, 706
- longest common substring – related problems, 451, 692
- longest cycle, 557, 598
- longest increasing subsequence, 324, 692
- longest path, 556, 598
- longest path, DAG, 231, 535
- loop, 31
- lossless encodings, 693
- lossy encodings, 693
- lottery problems, 22
- Lotto problem, 518
- low-degree spanning tree, 551, 553
- lower bound, 35, 144, 516, 629
- lower bound – range searching, 643
- lower bound – sorting, 509
- lower triangular matrix, 468
- LU-decomposition, 468, 476
- lunar calendar, 532
- LZW algorithm, 694, 695

- machine clock, 487
- machine learning, 478
- machine learning – classification, 666
- mafia, 698
- magnetic tape, 470

- mail routing, 565
- maintaining arrangements – related problems, 625, 651
- maintaining line arrangements, 671
- Malawi, 125
- manufacturing applications, 594, 652
- map making, 669
- Maple, 493
- Markov chain random generation, 520
- marriage problems, 562
- master theorem, 154
- matching, 267, 562, 679
- matching – applications, 597
- matching – dual to, 590
- matching – number of perfect, 476
- matching – related problems, 477, 536, 567, 573, 681
- matching shapes, 664
- Mathematica, 455, 466, 493, 520, 523, 527, 531, 561, 567, 580, 606, 708, 716
- mathematical notation, 31
- mathematical programming, 479, 482
- mathematical software – netlib, 715
- matrix bandwidth, 470
- matrix compression, 709
- matrix inversion, 469, 472
- matrix multiplication, 156, 472, 560
- matrix multiplication – applications, 476
- matrix multiplication – related problems, 469
- matrix-tree theorem, 553
- matroids, 553
- max-cut, 602
- max-flow, min-cut theorem, 570
- maxima, 479
- maximal clique, 586
- maximal matching, 592
- maximum acyclic subgraph, 397, 618

- maximum cut – simulated annealing, 410
- maximum spanning tree, 253
- maximum-cardinality matchings, 563
- maze, 213, 545
- McDonald's restaurants, 634
- MD5, 701
- mean, 514
- mechanical computers, 492
- mechanical truss analysis, 467
- medial-axis transform, 655, 657
- median – application, 508
- median and selection, 514
- medical residents to hospitals – matching, 564
- memoization, 309
- memory accesses, 552
- mems, 552
- Menger's theorem, 569
- mergesort, 129, 147, 506
- merging subsets, 457
- merging tapes, 508
- mesh generation, 630, 635
- Metaphone, 692
- Metropolis algorithm, 481
- middle-square method, 489
- millennium bug, 532
- Miller-Rabin algorithm, 492
- mindset, 429
- minima, 479
- minimax search, 160
- minimizing automata, 703
- minimum change order – subsets, 522
- minimum equivalent digraph, 560
- minimum product spanning tree, 253
- minimum spanning tree (MST), 244, 437, 445, 458, 549, 599
- minimum spanning tree – applications, 256, 394
- minimum spanning tree – drawing, 578
- minimum spanning tree – related problems, 459, 597, 617
- minimum weight triangulation, 633
- minimum-change order, 520
- Minkowski sum, 668, 674
- Minkowski sum – applications, 662
- Minkowski sum – related problems, 657, 670
- MIX assembly language, 496
- mixed graphs, 567
- mixed-integer programming, 483
- mode, 141, 515
- mode-switching, 327
- modeling, 430
- modeling algorithm problems, 17
- modeling graph problems, 274
- models of computation, 509
- modular arithmetic, 495
- molecular docking, 667
- molecular sequence data, 616
- Mona Lisa, 564
- monotone decomposition, 660
- monotone polygons, 633
- monotone subsequence, 323
- Monte Carlo techniques, 481, 486
- month and year, 532
- motion planning, 556, 667
- motion planning – related problems, 558, 651, 676
- motion planning – shape simplification, 661
- mountain climbing, 479
- move to front rule, 441, 511
- moving furniture, 667
- MPEG, 694
- multicommodity flow, 572
- multiedge, 199
- multigraph, 202
- multiple knapsacks, 499
- multiple sequence alignment, 707
- multiplication, 493, 502
- multiplication algorithms, 65
- multiplication, matrix, 473
- multiset, 303, 519
- musical scales, 506

- name variations, recognizing, 691
- naming concepts, 636
- nanosecond, 37
- national debt, 493
- National Football League (NFL), 608
- National Security Agency (NSA), 698
- nauty, 531, 613
- NC – Nick’s class, 485
- nearest neighbor – related problems, 636
- nearest neighbor graph, 595, 639
- nearest neighbor heuristic, 6
- nearest neighbor search, 462, 634, 637
- nearest neighbor search – related problems, 463, 647
- negation, 538
- negative-cost cycle, 555
- negative-cost edges, 261, 555
- Neo4j, 453
- NEOS, 481, 485
- Netlib, 466, 469, 471, 473, 503, 632, 636, 715
- network, 18
- network design, 225, 614
- network design – minimum spanning tree, 549
- network flow, 267, 483, 569, 571
- network flow – applications, 601
- network flow – related problems, 485, 558, 564, 570, 603
- network reliability, 543, 568
- Network-Enabled Optimization System (NEOS), 481, 485
- next subset, 522
- Nobel Prize, 54, 161
- noisy channels, 589
- noisy images, 661, 665
- non self intersecting polygons, 628
- non-crossing drawing, 581
- non-deterministic automata, 703
- non-Euclidean distance metrics, 635
- non-numerical problems, 505
- non-uniform access, 511
- notorious NP-complete problem, 594
- NP, 381, 492
- NP-complete problem, 498, 535, 561, 602
- NP-complete problem – bandwidth, 470
- NP-complete problem – crossing number, 582
- NP-complete problem – NFA minimization, 703
- NP-complete problem – satisfiability, 537
- NP-complete problem – set packing, 683
- NP-complete problem – superstrings, 710
- NP-complete problem – tetrahedralization, 631
- NP-complete problem – tree drawing, 580
- NP-complete problem – trie minimization, 344
- NP-completeness, 355
- NP-completeness – definition of, 381
- NP-completeness – theory of, 367
- NP-hard problems, 476
- nuclear fission, 524
- number field sieve, 491
- number theory, 490, 493
- numerical analysis, 470
- numerical precision, 623
- Numerical Recipes, 465, 469
- numerical root finding, 480
- numerical stability, 468, 483
- O-notation, 34
- objective function, 478
- obstacle-filled rooms, 555
- OCR, 326
- octtree, 461
- odd-degree vertices, 566
- odd-length cycles, 563, 607
- off-line problem, 653

- oligonucleotide arrays, 414
- on-line problem, 653
- one million, 281
- one-sided binary search, 149, 512
- online algorithm resources, 718
- open addressing, 94
- OpenGL graphics library, 90
- operations research, 482
- optical character recognition, 276, 655, 660, 664
- optical character recognition – system testing, 688
- optimal binary search trees, 513
- optimization, 478
- order statistics, 514
- ordered set, 456
- ordering, 18, 517
- organ transplant, 69
- orthogonal planes, 461
- orthogonal polyline drawings, 575
- orthogonal range query, 641
- outerplanar graphs, 583
- outlying elements, 514
- output-sensitive algorithms, 649
- over-determined linear systems, 482
- overlap graph, 710
- overpasses – highway, 582
- Oxford English Dictionary, 22
- P, 381
- P-completeness, 485
- packaging, 18
- packaging applications, 652
- packing vs. covering, 679
- paging, 443, 454
- pairing heap, 447
- palindrome, 450
- paradigms of algorithms design, 506
- parallel algorithms, 159, 469
- parallel algorithms – graphs, 567
- parallel lines, 622
- parallel processor scheduling, 534
- paranoia level, 698
- parenthesization, 473
- PARI, 491
- parse trees, 611
- parsing, 687
- partial key search, 462
- partial order, 447, 505
- partitioning automata states, 703
- partitioning point sets, 460
- partitioning polygons into convex pieces, 659
- partitioning problems, 333, 682
- party affiliations, 457
- Pascal, 552, 639, 681, 684
- password, 486, 698
- Pat tree, 451
- patented algorithms, 694
- path, 542
- path generation – backtracking, 287
- path planning, 635
- path reconstruction, 319
- paths – counting, 473, 612
- paths across a grid, counting, 312
- paths in graphs, 217
- pattern matching, 685, 688, 702, 704
- pattern recognition, 664
- pattern recognition – automata, 686
- patterns, 19
- PAUP, 616
- PDF-417, 326
- penalty costs, 321
- penalty functions, 480
- perfect hashing, 444
- perfect matching, 563
- performance guarantee, 592
- performance in practice, 8
- period, 488
- periodicities, 502
- Perl, 685
- permanent, 476
- permutation, 18, 475
- permutation comparisons, 707
- permutation generation, 517
- permutation generation – backtracking, 286

- permutation matrix, 472
- perpendicular bisector, 635
- personality conflicts – avoiding, 682
- PERT/CPM, 536
- Petersen graph, 574
- PGP, 491, 699
- phone company, 549
- PHYLIP, 616
- phylogenetic tree, 615, 616
- piano mover’s problem, 670
- Picasso, P., 649, 713
- pieces of a graph, 542
- pilots, 430
- pink panther, 274
- pivoting rule, 483
- pivoting rules, 468
- pixel geometry, 656, 665
- planar drawings, 453, 578
- planar drawings – related problems, 580
- planar graph, 453, 575
- planar graph – clique, 587
- planar graph – coloring, 605
- planar graph – isomorphism, 613
- planar separators, 602
- planar subdivisions, 646
- planar sweep algorithms, 650
- planarity detection and embedding, 581
- planarity testing – related problems, 577
- plumbing, 571
- point in polygon, 644
- point location, 461, 644
- point location – related problems, 463, 636, 643, 673
- point robots, 667
- point set clusters, 549
- point-spread function, 502
- pointer manipulation, 69
- points, 18
- polygon partitioning, 658
- polygon partitioning – related problems, 633
- polygon triangulation, 632
- polygonal data structure, 98
- polygons, 19
- polyhedral simplification, 662
- polyline graph drawings, 575
- polynomial evaluation, 495
- polynomial multiplication, 502
- polynomial-time approximation scheme (PTAS), 500
- polynomial-time problems, 541
- poor thin people, 641
- pop, 75
- popular keys, 511
- porting code, 275
- positions, 18
- potential function, 478
- power diagrams, 636
- power set, 459
- powers of graphs, 612
- Prüfer codes, 530, 531
- precedence constraints, 546, 618
- precedence-constrained scheduling, 534
- precision, 465
- preemptive scheduling, 536
- prefix – string, 448
- preflow-push methods, 573
- preprocessing – graph algorithms, 542
- presortedness measures, 509
- previous subset, 522
- PRF, 573
- price-per-pound, 497
- pricing rules, 125
- Prim’s algorithm, 245, 246, 259, 550
- primality testing, 490, 698
- prime number, 442
- prime number theorem, 491
- principle of optimality, 340
- printed circuit boards, 254, 594
- printing a graph, 212
- priority queues, 88, 445
- priority queues – applications, 92, 116, 650, 680
- priority queues – arithmetic model, 509

- priority queues – related problems, 516
- probability, 172
- probability density function, 176
- probability distribution, 176
- probability of an event, 173
- probability of an outcome, 173
- problem – definition, 3
- problem descriptions, 437
- problem instance, 3
- problem-solving techniques, 429, 433
- procedure call overhead, 440
- producer/consumer sectors, 620
- profile minimization, 470
- profit maximization, 482
- Program Evaluation and Review Technique, 536
- program flow graph, 199
- program libraries, 465
- program structure, 569
- programming languages, 12
- programming time, 511
- Prolog, 342
- proof of correctness, 4
- propagating consequences, 559
- pruning – backtracking, 290, 471, 612
- pseudocode, 12
- pseudorandom numbers, 486
- psychic lotto prediction, 22
- PTAS, 500
- public key cryptography, 493, 500, 698
- push, 75
- Python, 493
- Qhull, 628, 632, 636, 651
- qsort(), 115
- quadratic programming, 484
- quadratic-sieve method, 492
- quadtree, 461
- quality triangulations, 635
- quantum complexity theory, 421
- quantum computing, 418, 513
- quantum gates, 419
- qubits, 419
- questions, 430
- queue, 75, 445
- queue – applications, 221
- quicksort, 130, 506, 508
- quicksort – applications, 515
- rabbits, 308
- Rabin–Karp algorithm, 687
- radial embeddings, 579
- radio stations, 636
- radius of a graph, 557
- radix sort, 507
- RAM, 443
- Random Access Machine (RAM), 31
- random graph theory, 531, 606
- random graphs – generation, 529
- random permutations, 518, 520
- random perturbations, 623
- random sampling – applications, 669
- random search tree, 443
- random subset, 522
- random variable, 173
- random-number generation, 486, 502, 530
- random-number generation – related problems, 520
- randomization, 130
- randomized algorithms, 486, 491, 552, 570, 603
- randomized incremental algorithms, 635, 646, 651, 673
- randomized quicksort, 508
- randomized search – applications, 24
- range search, 462, 641
- range search – related problems, 463, 640
- ranked embedding, 579
- ranking and unranking operations, 23, 517, 532
- ranking combinatorial objects, 505
- ranking permutations, 518

- ranking subsets, 522
- rasterized images, 675
- reachability problems, 559
- reading graphs, 205
- rebalancing, 443
- recommendations, caveat, 438
- rectangle, 654
- rectilinear Steiner tree, 615
- recurrence relation, basis case, 313
- recurrence relations, 152, 308
- recurrence relations – evaluation, 312
- recursion, 217, 223
- recursion – applications, 690
- recursion and induction, 15
- red-black tree, 443
- reduction, 356, 591
- reduction – direction of, 369
- reflex vertices, 659
- region of influence, 634
- regions, 19
- regions formed by lines, 671
- register allocation, 604
- regular expressions, 686, 702
- relationship, 18
- reliability, network, 543
- repeated vertices, 599
- replicating vertices, 563
- representative selection, 679
- resource allocation, 482, 497
- resources – algorithm, 713
- restricted growth function, 526
- retrieval, 451, 510
- reverse-search algorithms, 629
- Right Stuff, The, 430
- riots ensuing, 533
- Rivest-Shamir-Adelman, 698
- road network, 197, 199, 543, 575
- robot assembly, 5, 594
- robot motion planning, 649, 667, 674
- robust geometric computations, 476, 622
- root finding algorithms, 150, 466, 480
- rooted tree, 458, 578
- rotating-calipers method, 626
- rotation, 443
- rotation – polygon, 668
- roulette wheels, 487
- round-off error, 465, 468
- RSA algorithm, 490, 493, 698
- RSA-129, 492
- rules of algorithm design, 430
- run-length coding, 694
- s-t connectivity, 569
- safe cracker sequence, 567
- sample space, 172
- satisfiability, 367, 421
- satisfiability – related problems, 481, 705
- satisfying constraints, 480
- SBH, 99
- scaling, 468, 499
- scanner, OCR, 502
- scattered subsequences, 706
- scene interpolation, 667
- scheduling, 231, 534, 618
- scheduling – precedence constraints, 546
- scheduling – related problems, 589, 609, 620
- scheduling problems, 571
- schoolhouse method, 494
- scientific computing, 465, 467, 478
- search time minimization – magnetic media, 470
- search tree, 443, 446
- searching, 510
- searching – related problems, 444, 509
- secondary key, 507
- secondary storage devices, 693
- secure hashing function, 701
- security, 486, 697
- seed, 487
- segment intersection, 649
- segmentation, 276, 554
- selection, 18, 111, 514
- selection – subsets, 521
- selection sort, 115

- self-intersecting polygons, 662
- self-loop, 202
- self-organizing list, 441, 511
- self-organizing tree, 443, 513
- semidefinite programming, 603
- sentence structure, 554
- separation problems, 589
- separator theorems, 602
- sequence, 18
- sequencing by hybridization
(SBH), 99
- sequencing permutations, 518
- sequential search, 510, 638
- set, 456
- set algorithms, 677
- set cover, 483, 591, 678
- set cover – applications, 23
- set cover – exact, 683
- set cover – related problems, 459,
593, 660, 684
- set data structures, 79, 98, 456
- set data structures – applications,
24
- set data structures – related
problems, 455
- set packing, 521, 682
- set packing – related problems,
654, 681
- set partition, 457, 524
- shape of a point set, 626
- shape representation, 655
- shape similarity, 664
- shape simplification, 661
- shape simplification – applications,
645, 668
- shapes, 19
- shellsort, 506
- Shifflett, 136
- shift-register sequences, 489
- shipping applications, 652
- shipping problems, 571
- Shor’s algorithm, 423
- shortest common superstring, 709
- shortest common superstring –
related problems, 696, 708
- shortest cycle, 556
- shortest path, 258, 447, 483, 554,
571
- shortest path – applications, 266,
276
- shortest path – geometric, 274, 635
- shortest path – related problems,
447, 474, 545, 561, 613,
617, 670
- shortest path, unweighted graph,
217
- shortest-path matrix, 612
- shotgun sequencing, 709
- shuffling, 697
- sieving devices – mechanical, 492
- sign – determinant, 476
- sign – permutation, 475
- signal processing, 501
- signal propagation minimization,
470
- simple cycle, 557
- simple graph, 199, 202
- simple polygon – construction, 628
- simple polygons, 662
- simplex method, 483
- simplicial complex, 475
- simplicity testing, 663
- simplifying polygons, 661
- simplifying polygons – related
problems, 676
- simulated annealing, 481, 486, 576,
587, 596, 599, 603, 606,
619, 680, 683
- simulated annealing – satisfiability,
538
- simulated annealing – theory, 406
- simulations, 445
- simulations – accuracy, 486
- sin, state of, 486
- sine functions, 501
- single-precision numbers, 465, 493
- single-source shortest path, 555
- singular matrix, 467, 475
- singular value decomposition
(SVD), 467
- sink vertex, 546
- sinks – multiple, 572

- sites, 18
- size of graph, 452
- skeleton, 655, 665
- skewed distribution, 441
- Skiena, Len, 8, 18
- skiing, 696
- skinny triangles, 631
- skip list, 444
- slab method, 645
- slack variables, 484
- smallest element, 514
- Smith Society, 507
- smoothing, 501, 674
- smoothness, 480
- snow plows, 565
- soap films, 617
- social networks, 201
- software engineering, 569
- software tools, 578
- solar year, 533
- solving linear equations, 467
- solving linear equations – related problems, 471, 474, 477
- sorted array, 442, 446
- sorted linked list, 442, 446
- sorting, 3, 445, 506
- sorting $X + Y$, 126
- sorting - applications, 110
- sorting – applications, 497, 515
- sorting – cost of, 511
- sorting – rationales for, 109
- sorting – related problems, 444, 447, 513, 516, 548, 629
- sorting – strings, 450
- sound-alike strings, 691
- Soundex, 97, 691, 692
- source vertex, 546
- sources – multiple, 572
- space decomposition, 460
- space minimization – digraphs, 560
- space minimization – string matching, 690
- space-efficient encodings, 693
- spanning tree, 549
- sparse graph, 202, 452, 581
- sparse matrices – compression, 709
- sparse subset, 457
- sparse systems, 468
- sparsification, 455
- spatial data structure, 98
- special-purpose hardware, 701
- speedup – parallel, 160
- spelling correction, 314, 687, 688
- sphere packing, 654
- Spinout puzzle, 523
- spiral polygon, 644
- splay tree, 443
- splicing cycles, 566
- splines, 466
- split-and-merge algorithm, 662
- spreadsheet updates, 559
- spring embedding heuristics, 576, 579
- square of a graph, 238, 473, 474
- square root of a graph, 474
- square roots, 150
- stable marriages, 564
- stable sorting, 507
- stack, 75, 445
- stack – applications, 221
- stack size, 508
- standard deviation, 177
- standard form, 484
- Stanford GraphBase, 454, 716
- star-shaped polygon decomposition, 660
- state elimination, automata, 703
- static tables, 510
- statistical significance, 519
- statistics, 514
- steepest descent methods, 480
- Steiner points, 632
- Steiner ratio, 616
- Steiner tree, 614
- Steiner tree – related problems, 553
- Steiner vertices, 659
- Stirling numbers, 526
- stock exchange, 465
- stock picking, 478
- straight-line graph drawings, 575, 583

- Strassen's algorithm, 469, 473, 474, 560
- strategy, 429
- strength of a graph, 543
- string, 456
- string algorithms, 677
- string data structures, 98, 448, 686
- string matching, 448, 685
- string matching – related problems, 451, 613, 692, 705
- string overlaps, 710
- strings, 19
- strings – combinatorial, 530
- strings – generating, 523
- strongly connected component, 233
- strongly connected graphs, 543, 568
- subgraph isomorphism, 611
- subgraph isomorphism – applications, 665
- subroutine call overhead, 440, 494
- subset, 18
- subset generation, 521
- subset generation – backtracking, 284
- subset sum problem, 498
- substitution cipher, 697
- substitutions, text, 688
- substring matching, 322, 448, 689
- subtraction, 493
- suffix arrays, 448, 450
- suffix trees, 98, 448, 686
- suffix trees – applications, 706, 710
- suffix trees – computational experience, 101
- suffix trees – related problems, 687, 711
- sunny days, 666
- supercomputer, 54
- superstrings – shortest common, 709
- surface interpolation, 630
- surface structures, 581
- swap elements, 519
- swapping, 443
- sweep line algorithms, 635, 650, 672
- Symbol Technologies, 326
- symbolic computation, 479
- symbolic set representation, 459
- symmetric difference, 664
- symmetry detection, 610
- symmetry removal, 290
- tactics, 429
- tail recursion, 508
- tape drive, 507
- taxonomy, 18
- technical skills, 430
- telephone books, 49, 136, 512
- terrorist, 225, 568
- test data, 528
- test pilots, 430
- testing planarity, 582
- tetrahedralization, 630
- text, 19
- text compression, 327, 489, 693
- text compression – related problems, 451, 503, 701, 711
- text data structures, 448, 686
- text processing algorithms, 685
- text searching with errors, 688
- textbooks, 716
- thermodynamics, 406
- thinning, 655
- thinning – related problems, 666, 676
- three-points-on-a-line, 672
- tight bound, 35
- time slot scheduling, 534
- time-series analysis, 501
- Timsort, 509
- tool path optimization, 594
- topological graph, 200
- topological sorting, 231, 546
- topological sorting – applications, 275, 534
- topological sorting – related problems, 471, 509, 536, 620

- topological sweep, 673
- tour, 18
- traceback, dynamic programming, 319
- transition matrix, 702
- transitive closure, 263, 472
- transitive reduction, 472, 559
- translation – polygon, 668
- transmitter power, 636
- transportation problems, 529, 554, 594
- transpose of a graph, 233
- transposition, 519
- trapezoidal decomposition, 660
- traveling salesman, 8, 483, 517
- traveling salesman – applications, 255, 710
- traveling salesman – approximation algorithms, 393
- traveling salesman – decision problem, 356
- traveling salesman – related problems, 539, 553, 600
- traveling salesman problem, 299
- traveling salesman problem (TSP), 594
- tree edge, 222
- tree identification, 544
- trees, 18, 453
- trees – acyclic graphs, 619
- trees – drawings, 575
- trees – generation, 530
- trees – hard problem in, 471
- trees – independent set, 590
- trees – matching, 611
- trees – partition, 602
- trial division, 490
- Triangle, 632
- triangle inequality, 393, 594
- triangle refinement method, 647
- triangle strips, 90, 211
- triangulated surfaces, 90
- triangulation, 630
- triangulation – applications, 641, 645, 658, 675
- triangulation – related problems, 636, 660
- triconnected components, 570
- trie, 342, 448
- TSP, 594
- TSPLIB, 597, 718
- turnpike reconstruction problem, 304
- twenty questions, 148
- two's complement arithmetic, 494
- two-coloring, 219
- unbounded search, 149, 512
- unconstrained optimization, 479, 484, 510
- unconstrained optimization – related problems, 489
- undirected graph, 198, 201
- uniform distribution, 441, 488, 519
- union of polygons, 650
- union of polygons – applications, 675
- union, set, 456
- union-find data structure, 458
- union-find data structure – applications, 550
- unit cube, 462
- unit sphere, 462
- universal set, 456
- unknown data structures, 439
- unlabeled graphs, 200, 528, 611
- unranking combinatorial objects, 505
- unranking permutations, 518
- unranking subsets, 522
- unsorted array, 441
- unsorted list, 441
- unweighted graph, 199
- unweighted graphs – spanning trees, 551
- upper bound, 35
- upper triangular matrix, 468
- Utah, 696
- validation, 699
- van Emde Boas priority queue, 447

- Vancouver Stock Exchange, 465
- variable elimination, 467
- variable length encodings, 695
- variance, 177
- vector quantification, 637
- vector sums, 674
- vertex, 198
- vertex coloring, 275, 524, 604, 609
- vertex coloring – applications, 534
- vertex coloring – bipartite graphs, 219
- vertex coloring – related problems, 536, 590, 609
- vertex connectivity, 229
- vertex cover, 521, 591
- vertex cover – approximation algorithm, 390
- vertex cover – hardness proof, 363, 369
- vertex cover – related problems, 564, 588, 590, 681
- vertex degree, 446, 530
- vertex disjoint paths, 569
- vertex ordering, 470
- video compression, 693, 694
- virtual memory, 443, 508
- virtual memory – performance, 601
- virtual reality applications, 648
- visibility graphs, 649, 667
- Viterbi algorithm, 267
- Vizing’s theorem, 553, 608
- VLSI circuit layout, 614, 648
- VLSI design problems, 455
- volume computations, 475, 624
- von Neumann, J., 509
- Voronoi diagram, 631, 634
- Voronoi diagrams – nearest neighbor search, 638
- Voronoi diagrams – related problems, 629, 633, 640, 647, 657
- walk-through, 648
- war story, 22, 161, 210, 254, 342, 375, 414
- Waring’s problem, 54, 161
- Warshall’s algorithm, 559
- water pipes, 614
- wavelets, 503
- weakly connected graphs, 543, 568
- web, 18
- Website, 438
- weighted graph, 199
- weighted graphs, applications, 563
- Winograd’s algorithm, 474
- wire length minimization, 470
- wiring layout problems, 614
- word ladders, 716
- worker assignment – scheduling, 535
- worst-case complexity, 33
- Xerox machines – scheduling, 536
- Young tableaux, 527, 708
- Zipf’s law, 511
- zone theorem, 672, 673