 # Graph

Connectivity	BFS/DFS	O(m+n)
Bipartiteness	BFS/DFS	O(m+n)
Minimum Spanning Tree	Kruskal's	O(E log E) time O(E) space
Minimum Spanning Tree	Lazy Prim's	O(E log E) time O(E) space
Minimum Spanning Tree	Red-rule Blue-rule	
Single pair shortest path	Dijkstra's shortest path	O(E log V) time O(V) space
Single-source shortest paths	Dijkstra's shortest paths	O(E log V) time O(V) space
SS Longest paths in ew DAGs	Dijkstra's shortest path *	O(E log V) time O(V) space

* shortest path in this copy is the longest path

 # Divide and Conquer

Sorting	Mergesort	O(N log N) time O(log N) space
Sorting	Randomized Quicksort	O(N log N) time O(N) space
Integer Multiplication	Grade-school	Theta(n^2) time
Integer Multiplication	Karatsuba multiplication	O(n^1.585) time
Closest pair of points	Kleinberg-Tardos Closest Pair	

Greedy

Coin changing	Cashier's	
Interval Scheduling	Earliest-finish-time-first	
Interval Partitioning	Earliest-start-time-first	

 # Dynamic Programming

Weighted Interval Scheduling	top-down	O(n log n) time
Subset sums	bottom-up	
Knapsack	bottom-up	O(nW) or O(n*2^m) time, where m is the number of bits in W
Sequence alignment	bottom-up	Theta(m n) time
Single pair shortest path	Bellman–Ford	O(E V) time O(V) space

Network Flows

Minimum-cut	Ford-Fulkerson	O(m n C) time
Maximum-flow	Ford-Fulkerson	O(m n C) time
Maximum Matching	Ford-Fulkerson	O(m n C) time
Bipartite Matching	Ford-Fulkerson	O(m n) time
Largest Bipartite Matching	?	O(N^3) time

 # NP

Contraint Satisfaction

Circuit-SAT	NP-Complete
3-SAT	NP-Complete

Packing and Covering

Independent set	NP-Complete
Vertex cover	NP-Complete
Set cover	NP-Complete
Set packing	NP-Complete

Sequencing

Directed Hamiltonian cycle	NP-Complete
Hamiltonian cycle	NP-Complete
Hamiltonian path	NP-Complete
Longest Path	NP-Hard (decision NP-C exists)
Traveling Salesman Problem	NP-Hard (decision NP-C exists)

Partitioning

Graph 3-color	NP-Complete
Planar 3-color	NP-Complete

Numerical

Subset sums	NP-Complete
Scheduling release/deadline	NP-Complete

----- Integer Factorization (NP and not P and not NP-Hard),Maximum cut, 3D matching, Factoring, Integer linear programming

Karp reduction, Cook-Levin reduction