SIN first partial

Properties

- **Completeness**: a solution is always found, if it exists
- **Optimality**: the found cost is always minimal
- **Admissibility**: $\forall n \ h(n) \leq h^\star(n)$
- **Consistency** (or monotonic): For all n' adjacent to n it holds $h(n) \leq c(n, n') + h(n')$
- **Dominance**: $h_2(n)$ dominates $h_1(n)$ if and only if $\forall n \ h_1(n) \leq h_2(n) \leq h^\star(n)$

Consistency implies admissibility, but the opposite is not always true

Comparison table

- $|V|$: number of vertices
- $|E|$: number of edges
- b: branching factor
- d: depth
- m: maximum depth

	Complete	Optimal	Time complexity	Space complexity
BFS	Yes	Yes	Explicit: $O(\|V\| + \|E\|)$ Implicit: $O(b^d)$	Explicit: $O(\|V\| + \|E\|)$ Implicit: $O(b^d)$
m-DFS	No	No	$O(b^m)$	$O(bm)$
Backtracking	No	No	$O(b^m)$	$O(m)$
IDS	Yes	Yes	$O(b^d)$	$O(bd)$
Graph search	Yes	No	$O(\|V\| + \|E\|)$	$O(\|V\| + \|E\|)$
UCS	Yes	Yes	Explicit: $O(\|E\| \log \|V\|)$ Implicit: $O(b^{d+1})$	Explicit: $O(\|E\| \log \|V\|)$ Implicit: $O(b^{d+1})$
A* ($f = g + h$)	Yes	Iff h admissible	Same as UCS iff h consistent	Same as UCS iff h consistent
Greedy ($f = h$)	Yes	No	$O(b^m)$	$O(b^m)$
IDA*	Yes	Iff h admissible	$O(b^d)$	$O(d)$

Minimax

Must be *deterministic*, *two-player*, *turn-taking*, *perfect info* and *zero-sum*.