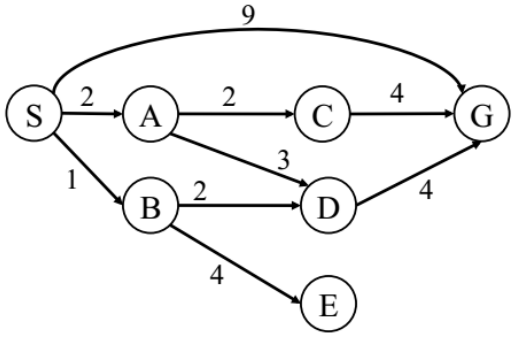
A* and Admissible/Consistent heuristics

Consider the following search problem, represented as a graph. The initial state is **S** and the only goal state is **G**. Assume ties resolve in such a way that states with earlier alphabetical order are expanded first.



Heuristic

S	A	B	C	D	E	G
6	0	6	4	1	10	0

Is the given heuristic admissible? Yes. Every node has h(n) <= h*(n)

Is the given heuristic consistent? No. The inconsistency happens at node S. h(S) = 6 > c(S, A) + h(A) = 2 + 0 = 4. Or at node B.

A* using the given admissible heuristic will expand two nodes representing the same state D.

List of expanded states: S A D B D G Path returned: S B D G (optimal)

Now, let's modify the heuristic values, at D to 4 and at A to 4, to obtain a consistent heuristic. How will A* behave? We don't have to expand D twice.

List of expanded states: S A B D G Path returned: S B D G (optimal)

What if expanding nodes with duplicate states is prohibited? (However, this is the old concept in the textbook AIMA Third edition).

List of expanded states: S A D B C G Path returned: S A C G (suboptimal)