ICS 171, Summer 2000: Lecture 3 Homework

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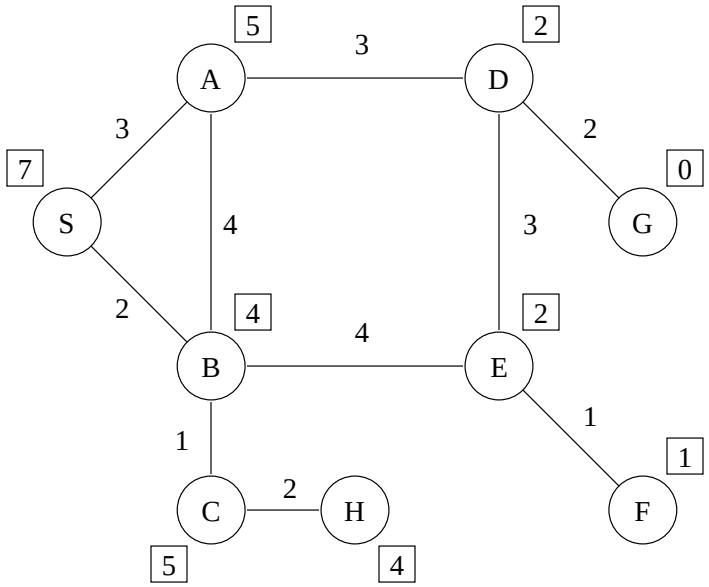
Due: August 22, 2000

(1) Consider the following graph representing the state space and operators of a navigation problem:



The path cost is shown by the number on the links; the heuristic evaluation is shown by the number in the box.

- When placing expanded child nodes on a queue, assume that the child nodes are placed in alphabetical order (i.e. if node S is expanded the queue will be: A B)
- Assume that we never generate child nodes that appear as ancestors of the current node in the search tree.

(a) What is the order that best first search will expand the nodes?

(b) What is the order that uniform cost search will expand the nodes?

(c) What is the order that A* search will expand the nodes?

(d) What is the order that IDA* search will expand the nodes?

(e) What is the order that hill-climbing search will expand the nodes?

(2) What will happen in best first search if we set $h(n) = -g(n)$?

(3) Question 4.2, parts b, c, and d in the course text (Russell & Norvig, page 118).

(4) Suppose that h_1 and h_2 are admissible heuristics. Which of the following are admissible?

$$\frac{(h_1 + h_2)}{2}$$

$$2h_1$$

$$\max(h_1, h_2)$$

(5) If h_1 and h_2 are admissible heuristics, which is the better method of combining them: $F = \max(h_1, h_2)$ or $G = (h_1 + h_2)/2$? Explain.