hw1_search_q13_a*_cscs

Question 13: A*-CSCS

2/2 points (ungraded)

Recall that a dictionary, also known as a hashmap, works as follows:
Inserting a key-value pair into a dictionary when the key is not already in the dictionary adds the pair to the dictionary:

```
dict ← an empty dictionary
dict["key"] ← "value"
print dict["key"]
→ "value"
```

Updating the value associated with a dictionary entry is done as follows:

```
dict["key"] ← "new value"
print dict["key"]
→ "new value"
```

We saw that for A^* *graph* search to be guaranteed to be optimal the heuristic needs to be consistent. In this question we explore a new search procedure using a dictionary for the closed set, A^*-graph-search-with-Cost-Sensitive-Closed-Set (A^* - CSCS).

```
function A*-CSCS-GRAPH-SEARCH(problem, fringe, strategy) return a solution, or failure
    closed ← an empty dictionary
    fringe ← INSERT(MAKE-NODE(INITIAL-STATE[problem]), fringe)
    loop do
        if fringe is empty then return failure
        node ← REMOVE-FRONT(fringe, strategy)
        if GOAL-TEST(problem, STATE[node]) then return node
        if STATE[node] is not in closed or COST[node] < closed[STATE[node]] then
            closed[STATE[node]] ← COST[node]
            for child-node in EXPAND(node, problem) do
                fringe ← INSERT(child-node, fringe)
            end
    end
```

Rather than just inserting the last state of a node into the closed set, we now store the last state paired with the cost of the node. Whenever A^*- CSCS considers expanding a node, it checks the closed set. Only if the last state is not a key in the closed set, or the cost of the node is less than the cost associated with the state in the closed set, the node is expanded.

For **regular A^* graph search** which of the following statements are true?

- [ ] If h is admissible, then A^* graph search finds an optimal solution.
- [x] If h is consistent, then A^* graph search finds an optimal solution.

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✔ Correct (2/2 points)

problem

2/2 points (ungraded)

In each of the following parts, select all true statements about A^***-CSCS**

- [x] If h is admissible, then A^*- CSCS finds an optimal solution.
- [x] If h is consistent, then A^*- CSCS finds an optimal solution.

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problem

2/2 points (ungraded)

- [x] If h is admissible, then A^*- CSCS will expand at most as many nodes as A^* **tree** search.
- [x] If h is consistent, then A^*- CSCS will expand at most as many nodes as A^* **tree** search.

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problem

2/2 points (ungraded)

- [ ] If h is admissible, then A^*- CSCS will expand at most as many nodes as A^* **graph** search.
- [x] If h is consistent, then A^*- CSCS will expand at most as many nodes as A^* **graph** search.

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