AI Planning for Autonomy

Solution Problem Set I: Heuristic Search

1.

Consider a set of cities V to visit in any order, a starting city location v_{start}, and a set of edges E specifying if there's an edge from two cities $\langle v, v' \rangle$:

$$
\begin{aligned}
S &= \{\langle current_v, V' \rangle | \, current_v \in V \wedge V' \subseteq V\} \\
S_0 &= \langle v_{start}, \{v_{start}\} \rangle \\
A(\langle current_v, V' \rangle) &= \{\langle current_v, v' \rangle | \, \langle current_v, v' \rangle \in E\} \\
f(\langle current_v, V' \rangle, \langle current_v, v' \rangle) &= \langle v', V' \cup v' \rangle \\
c(a, s) &= cost(edge) \\
S_G &= \{\langle current_v, V \rangle\}
\end{aligned}
$$

2.

- Is h *admissible*? yes
- Is h *consistent*? yes
- Which is the path returned by A^* as a solution? s_1 s_4 s_6 s_7
- Is this the optimal plan? Has the algorithm proved this? Yes, as h is admissible, if a cheapest path exists it should have been expanded already due to its smaller f value.