Problem 2

(a)

States: Determined by the location of the two friends and the total travel time elapsed (i,j,k) where i is city of first friend, j is city of second friend, and k is the sum of the maximum of each prior leg distance. For a map with x cities, there are x^2 combinations of i and j with infinite possibilities for k. E.g. In(Fagaras,Rimnicu Vilcea,15)

Initial state: (i,j,0) where i and j are starting cities.

Actions: move friend one and two over one city each. Add the maximum of the two length costs to k. E.g. if (Fagaras,Rimnicu Vilcea,15) one possible action is Go(Sibiu,Pitesti)

Transition model: the actions have their intended results. E.g. Result(In(Arad,Oradea,0),Go(Zerind,Zerind)) = (Zerind,Zerind,max(75,71))

Goal: In(x,x,k) where x is the same city for both friends. If we start out in same cities, k=0.

Path cost: maximum of travel length between two cities for two friends like above, i.e. max(75,71)=75 for (Arad,Oradea) -> (Zerind,Zerind)

(b)

(i) Yes. no path length is less than 1 so h<h* for all actions in all states.

(ii) No. transition could take D(i,j) to complete so 2*D(i,j) overestimates.

(iii) Yes. The transition always takes the longer path time of the two movements, so half of D(i,j) will always be less than the actual path time.

(c)

No, as every state is connected to every other state. There will always be a path from whatever state each friend is in to another state that is the same for both, by definition of the problem.

(d)

If the map contains a straight line and a cycle, this will cause all possible solutions to take that cycle, depending on initial state.