

AIFA TUTORIALS: August 23 2021

Instructions: Solve the problems given below using pen and paper. Write your name and roll number clearly on every page. Combine all pages into a single pdf file and submit the pdf file as an attachment in the given link for the Google Forms latest by 6:15 pm

1. Consider the COIN SELECTION problem defined as follows: Given a set S of n possible coins of value s_1, s_2, \dots , respectively. Given a total value C , find the minimum number of coins whose total value is exactly C . Solve this problem using state space heuristic search as follows:
 - a. Give a state space definition of problem with definition of state, state transformation rules, start and goal states and lower bound heuristic estimate. Give examples to explain your definition clearly.
 - b. Show the execution of algorithm A^* on the example of $S = \{1, 8, 6, 7, 4, 2\}$ and $C = 13$ clearly highlighting the state of OPEN and CLOSED lists along with g , h and f values and parent pointers at every stage.
2. For a minimization problem being solved using algorithm A^* for state space graphs with positive edge costs and non-negative heuristic estimates - answer the following questions with True or False. Give a justification for each case either by a proof or a counter-example:
 - a. The optimal cost solution may sometimes NOT be found when the heuristic estimates at every node are underestimates.
 - b. The optimal cost solution is NOT guaranteed to be found when the heuristic estimates at only one non-goal node is an overestimate.