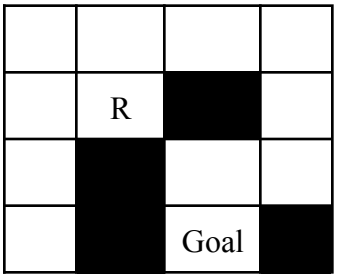
CSE422 || Spring 25 || Quiz 1 || Total Marks: 15 || Time: 30 minutes || Set A

Question 1 [Marks: 10]

In this problem, a n x m room is given and the position of the 'R' robot is given. The robot wants to travel to the goal. It can move to the top, left, bottom, and right adjacent cells (unit cost) which are not black. You are trying to find the shortest path from the R robot's position to the goal cell. The top left of the cell is (1, 1) cell. The goal is (4, 3) cell. [If P1 (x1, y1) and P2 (x2, y2) are two points then the Manhattan distance between those two is |x1 - x2| + |y1 - y2|]



a. Show the simulation of A* search algorithm (graph search version) with Manhattan distance as a heuristic. Show nodes with costs in the fringe at each step until the goal is removed from the fringe. [7]
b. Suppose you have three heuristic functions h1, h2 and h3. Among these h1 and h2 are admissible but h3 is inadmissible. You have decided to create several new heuristic functions defined as follows:
    - $h4(n) = 0$
    - $h5(n) = 2 \times h2(n)$
    - $h6(n) = (h1(n)+h2(n))/2$
    - $h7(n) = \max(h1(n), h2(n))$
    - $h8(n) = \min(h1(n), h3(n))$
    - $h9(n) = \max(h2(n), h3(n))$

Now answer the following questions and justify. [3]

i. Which two heuristics are possibly inadmissible? (h5, h9)
ii. Among h6 and h7 which one is dominant? (h7)
iii. In your opinion which heuristic is the best? (h7)

Question 2 [Marks 5]

Determine if the statements below are True/False. Justify your answers.

a. The acceptance of worse solutions in Simulated Annealing decreases as the temperature increases. [2.5]
b. Simulated Annealing does not require knowledge of the entire search space to work effectively. [2.5]