

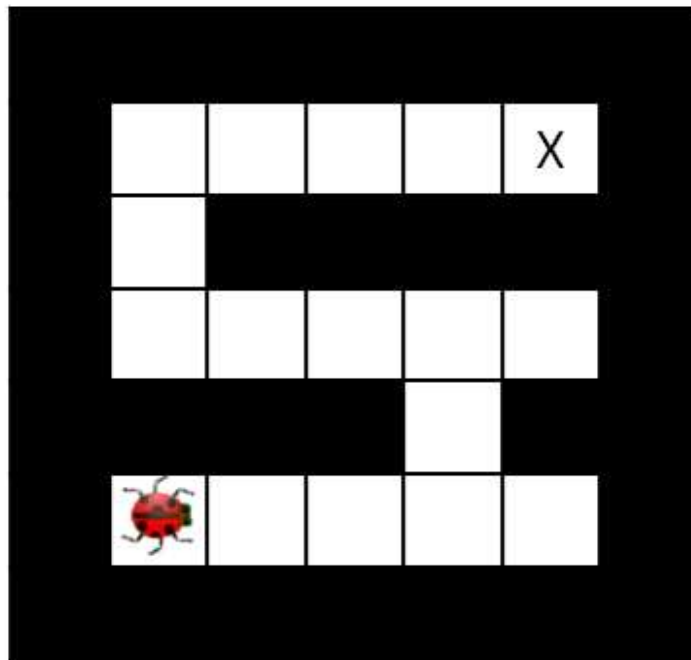
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hw1_search_q5_hive_minds_lonely_bug

Question 5: Hive Minds: Lonely Bug

0.0/9.0 points (graded)

You control a single insect as shown in the maze below, which must reach a designated target location X, also known as the hive. There are no other insects moving around.



Which of the following is a *minimal* correct state space representation?

- ☐ An integer d encoding the Manhattan distance to the hive.
- ☒ A tuple (x, y) encoding the x and y coordinates of the insect. ✓
- ☐ A tuple (x, y, d) encoding the insect's x and y coordinates as well as the Manhattan distance to the hive.

- ☐ This cannot be represented as a search problem.

The position tuple is enough to calculate the goal test and successor functions.

Goal test: $(x, y) = \text{Goal}$

Successor: Similar to Pacman successors. EAST changes (x, y) to $(x - 1, y)$, for example.

What is the size of the state space?

- ☒ MN ✓

- ☐ $(MN)^2$

- ☐ 2^{MN}

- ☐ M^N

- ☐ N^M

- ☐ $\max(M, N)$

There are MN total values that the position (x, y) can take.

Which of the following heuristics are admissible (if any)?

- ☒ Manhattan distance from the insect's location to the hive. ✓

- ☒ Euclidean distance from the insect's location to the hive. ✓

- ☐ Number of steps taken by the insect.

Option 1: If there were no walls, Manhattan distance is the true cost to the goal. Therefore, if there are walls, the Manhattan distance will always be an underestimate, so it is admissible.

Option 2: Euclidean distance will always be less than Manhattan distance, so it is admissible.

Option 3: Consider if the insect is 1 action from the goal, but has already taken 5 steps. This heuristic will return 5, which is an overestimate of the true cost of 1, so not admissible.

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i Answers are displayed within the problem