Problem 1

States:

Eat:

Problem 2

1. in step 1, a path from A to B using an admissible heuristic function
2. in step 2, a path from A to B using a non-admissible heuristic function
3. in step 3, a path from A to B using an admissible heuristic function
4. in step 4, a path from A to B using a non- admissible heuristic function

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | . | **C** | . | X | X | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | . | . | . | . | . | . | . | . | . |
| X | . | . | . | . | . | . | . | . | . | . | . | . | . | X | X | . | X | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| X | X | X | . | X | . | . | . | X | . | . | . | X | X | . | . | . | . | X | . | X | X | X | . | X | . | . | . | . | X | X | X |
| X | . | . | . | . | . | . | . | . | . | . | . | X | . | X | X | X | . | X | X | . | X | X | . | X | . | . | . | . | . | . | . |
| X | . | X | . | . | . | X | X | X | . | X | X | X | . | . | . | X | X | . | . | X | X | . | . | . | . | . | . | X | X | . | . |
| . | . | X | X | . | . | . | . | . | X | X | X | X | . | . | . | . | . | X | X | . | . | X | X | X | . | . | X | . | . | . | X |
| X | X | X | X | . | . | . | . | . | . | . | . | . | . | X | X | X | . | . | . | . | . | . | . | . | . | . | . | . | . | X | X |
| . | . | . | . | . | . | . | . | . | X | X | X | . | . | X | . | . | . | . | . | . | X | . | . | . | X | . | . | X | X | . | X |
| . | X | X | X | . | . | . | . | . | . | . | . | . | . | X | X | . | . | . | . | . | . | . | X | . | . | X | . | . | . | . | . |
| . | X | . | X | X | X | X | X | . | . | . | . | . | . | . | . | X | . | . | . | . | X | X | . | . | . | X | X | . | . | . | . |
| . | . | . | . | . | . | . | X | X | X | . | . | . | . | . | . | . | . | X | X | X | X | X | X | . | . | . | . | . | X | . | . |
| X | X | X | X | X | . | X | X | X |  | X | X | X | X | . | . | . | X | X | X | X | X | X | X | . | . | . | X | X | . | . | . |
| X | X | X | X | X | . | . | . | . | X | X | X | X | . | . | . | . | X | X | X | X | X | X | X | . | . | . | X | X | X | X | X |
| X | X | X | X | X | X | . | . | . | . | . | X | . | . | . | . | . | X | X | X | X | X | X | X | . | . | . | . | X | X | . | . |
| X | X | X | X | X | X | . | X | . | . | . | . | . | . | . | X | X | X | X | X | X | X | X | X | . | . | . | . | . | . | . | . |
| . | **A** | . | . | X | . | X | X | X | X | . | . | . | . | X | X | X | X | X | X | X | X | . | . | X | X | . | . | X | X | X | **B** |
| X | X | X | X | . | . | . | . | . | . | . | . | . | . | . | . | X | X | X | X | . | . | . | X | X | X | . | . | X | X | X | . |

This figure indicate the matrix that a robot can pass. “X” indicates obstacle that robot cannot pass, on the other hand “.” Indicates the cell is clear to pass.

Let 10 be the moving cost of moving horizontally and vertically, 14 be the moving cost of movie diagonally.

Step 1. Admissible heuristic function

Heuristic(A) = 30

dx = abs(A.x - B.x) = 30

dy = abs(A.y - B.y) = 0

distance = sqrt(dx\*dx + dy\*dy) = 30

Step 2.non-admissible heuristic function

Heuristic(A) = 30

Dx = abs(A.x – B.x) = 30

Dy = abs(A.y – B.y) = 0

(Dx + Dy) = 30

Step 3. Admissible heuristic function

Heuristic(A) =

dx = abs(A.x - C.x) = 23

dy = abs(A.y - C.y) = 16

distance = sqrt(dx\*dx + dy\*dy) = sqrt(785) = 28

Step 4. Non- admissible heuristic function

Heuristic(C) = 39

Dx = abs(A.x – C.x) = 23

Dy = abs(A.y – C.y) = 16

(Dx + Dy) = 39