Practice3: BFS

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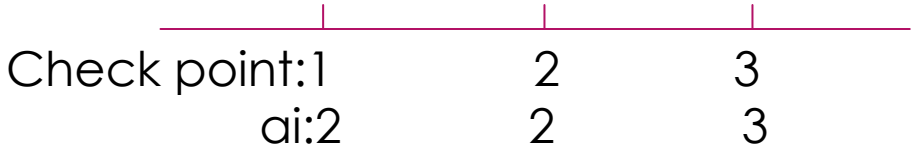
Question 1:

- FluffyT, the super bunny, successfully escaped from Satori's bunny shop. She then ran into an alley with N check points.
- As FluffyT is a super bunny, she can build a portal between check point i and a_i using 1 second and travel through within no time. However, she cannot travel in the opposite direction (from a_i to i). Also, she can run from check point i to check point $i-1$ and $i+1$ using 1 second.
- FluffyT is currently at check point 1. Can you tell her the minimum time to get to each check point?

Sample Input 1

n = 3
i = 1, 2, 3
ai = 2, 2, 3



minimum time

Check point 1: 1->1 0

Check point 2:
1->2 1
1->a1=2 1

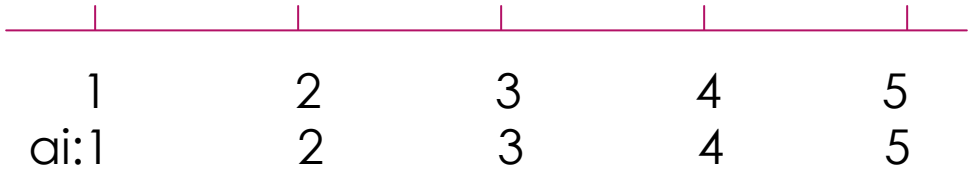
Check point 3:
1->2 ->3 2
1->a1=2->3 2

Sample Output
0 1 2

minimum time

Sample Input 2

n = 5
i = 1 2 3 4 5
ai= 1 2 3 4 5



Check point 1: 1 0

Check point 2: 1->2 1

Check point 3: 1->2 ->3 2

Check point 4: 1->2->3->4 3

Check point 5: 1->2->3->4->5 4

Sample Output 2
0 1 2 3 4

Sample Input 3

n =7
i = 1 2 3 4 5 6 7
ai = 4 4 4 4 7 7 7

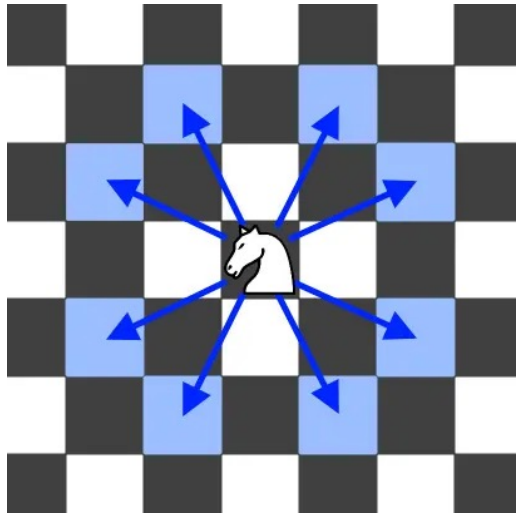
minimum time

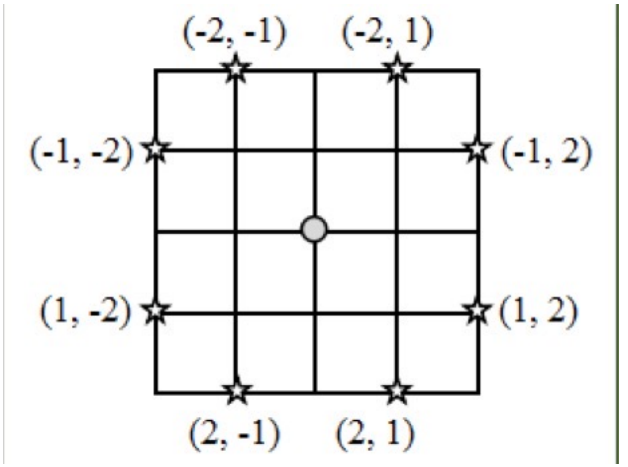
Check point 1: 1	0
Check point 2: 1->2	1
Check point 3: 1->2 ->3	2
Check point 4: 1->a1:4	1
Check point 5: 1-> a1:4 ->5	2
Check point 6: 1-> a1:4 ->5 ->6	3
Check point 7: 1-> a1:4 ->5 ->a5:7	3

Sample Output 3
0 1 2 1 2 3 3

Question 2:

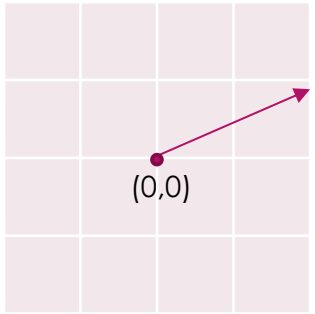
- A knight has 8 possible moves it can make, as illustrated below. Each move is two squares in a cardinal direction, then one square in an orthogonal direction.



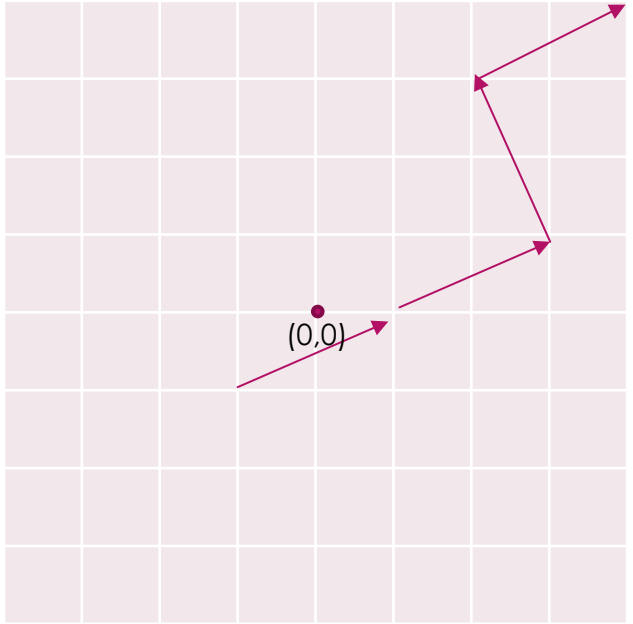


- On a n*n chess board, given the starting point (x1, y1) and the ending point (x2, y2), calculate the minimum number of moves a knight needs to make from the starting point to the ending point. If the knight cannot reach the ending point, return -1.

Example 1:
Input: n = 4, x1 = 0, y1 = 0, x2 = 2, y2 = 1
Output: 1
Explanation: [0, 0] → [2, 1]



Example 2:
Input: n = 8, x1 = -1, y1 = -1, x2 = 4, y2 = 4
Output: 4
Explanation: [-1, -1] → [1, 0] → [3, 1] → [2, 3] → [4, 4]



You can choose a problem to implement, the remaining one only describes the idea of solving the problem.

The practice will be checked in this lab class or the next lab class(before **Mar.23**) by teachers or SAs.

This practice will contribute **1 mark** to your overall grade. Late submissions within 2 weeks after the deadline (before Mar.30)will incur a 20% penalty, meaning that you can only get 80% of the score.