Street Lights

Problem ID: streetlights

During another of Lea's visits to her uncle in Chaosville, she realizes that the streets of Chaosville are in horrible condition. Driving at night is really dangerous: you never know when you will hit a pothole, because most street lights are not working and you see close to nothing. One day, Lea decides to visit the mayor's office to talk about the bad lighting on the streets. The mayor explains the city's problem to Lea: indeed, there are many street lights, but erected in an irregular fashion at the side of every street. And most of them are switched off due to severe budget cuts. Not willing to give up, Lea offers to come up with a plan that specifies how many of the street lights should be switched on to illuminate the main street, at least. The mayor agrees, but only if she can provide him with a solution that needs to switch on only as few street lights as possible.

Input

The first line of the input contains an integer t. t test cases follow, each of them separated by a blank line.

Each test case starts with three integers ℓ n d, the length of the main street ℓ, the number of street lights on main street n, and the radius of the light cone of each street light d, which indicates how far each light shines. Then, another line follows, consisting of n integers p_1 p_2 $\ldots$ p_n, describing the positions of the street lights.

Output

For each test case, output one line containing "Case #i: x" where i is its number, starting at 1, and x is either the smallest number of street lights that are needed to illuminate the whole main street (which goes in a straight line from 0 to ℓ), or "impossible" if there is no way to illuminate the whole street.

To illuminate the whole main street, there should be light from at least one street light at every point on the main street between 0 and ℓ. The boundary of each light cone is considered to be illuminated as well. In particular, this means that a point on the street is illuminated if two light cones touch there, they do not need to intersect. See the sample data explanation.

Constraints

- $1 \leq t \leq 20$
- $1 \leq \ell \leq 50000$
- $0 \leq n \leq \min(1000, \ell + 1)$
- $0 \leq d \leq 1000$
- $0 \leq p_i \leq \ell$ for all $1 \leq i \leq n$
- $p_i \neq p_j$ for all $1 \leq i, j \leq n$

Sample Data Explanation

In the first sample case, three street lights need to be switched on. Note that these may also be three different street lights, for example switching on the first, third, and sixth street light works as well. The second and third sample cases are impossible as there is always at least one section of the street that cannot be illuminated. In the fourth sample case, the street can be illuminated on its entire length by switching on all street lights. The points at which the light cones meet between the street lights are illuminated as well.

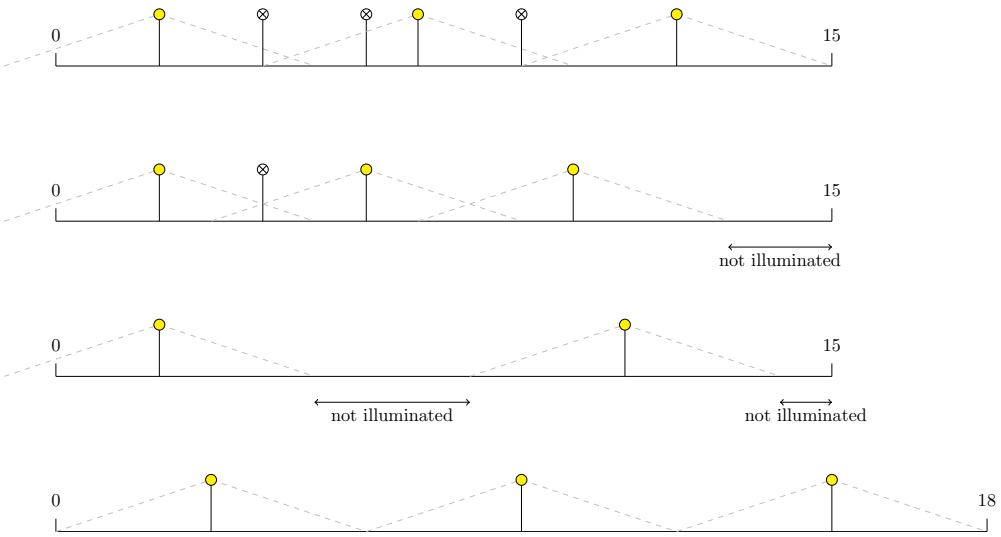

Figure 1: Visualization of the first four sample cases.

Sample Input 1

```
2
15 6 3
2 4 9 7 6 12

15 4 3
10 4 6 2
```

Sample Output 1

```
Case #1: 3
Case #2: impossible
```

Sample Input 2

```
7
15 2 4
2 11

18 3 3
3 15 9

21 14 4
14 8 10 7 20 21 3 6 18 15 16 12 9 5

9 9 3
1 2 7 3 8 0 9 6 4

14 12 5
2 3 12 10 8 1 7 0 5 13 14 11

23 14 3
2 9 7 11 5 19 8 0 23 14 15 6 21 10

14 8 4
14 8 0 6 13 9 10 1
```

Sample Output 2

```
Case #1: impossible
Case #2: 3
Case #3: 3
Case #4: 2
Case #5: 2
Case #6: 5
Case #7: 3
```