Problem 5: Radio Transmission

Input File: *radin.txt*
Output File: *radout.txt*

Time limit	Memory limit
2 seconds	256 MB

Statement

You are playing your favourite video game, ~~Celeste~~ ~~Raid Shadow Legends~~ ByteCity, where you are in charge of Byteland's radio communication system. There are N radio stations, numbered 1 through N and you operate from station 1. Each station has an *bandwidth*, and the bandwidth of the ith station is b_i.

Among the stations, M pairs of stations have direct radio links, the ith of which is between stations u_i and v_i. A message of length L can be transferred from station 1 to station x if:

1. The message passes through a maximum of D direct radio links to get from station 1 to station x. Radio links allow radio signals to travel in multiple directions.
2. The bandwidth of each station that the signal passes through, including station 1 and station x, is at least L.

In case an urgent message needs to be broadcast, you want at least K stations to be able to receive a message coming from station 1. Find the length of the longest message you can send such that this condition is satisfied.

Input

The first line of input contains 4 integers N M K D, the number of stations, the number direct radio links, the minimum number of stations to receive the message, and the number of stations the signal can travel through respectively.

The next line contains N integers b_1 ... b_N, the bandwidth of each station.

The next M lines each contain 2 integers u_i v_i. Each line indicates a direct radio link between station u and v.

Output

Output 1 integer, the longest message you can send. If any message cannot reach K stations, output 0.

Sample Input 1

```
7 7 4 3
9 7 6 11 3 8 10
1 2
1 5
2 3
2 4
4 6
5 6
6 7
```

Sample Output 1

```
7
```

Sample Input 2

```
3 3 3 3
5 6 11
1 2
1 3
2 3
```

Sample Output 2

```
5
```

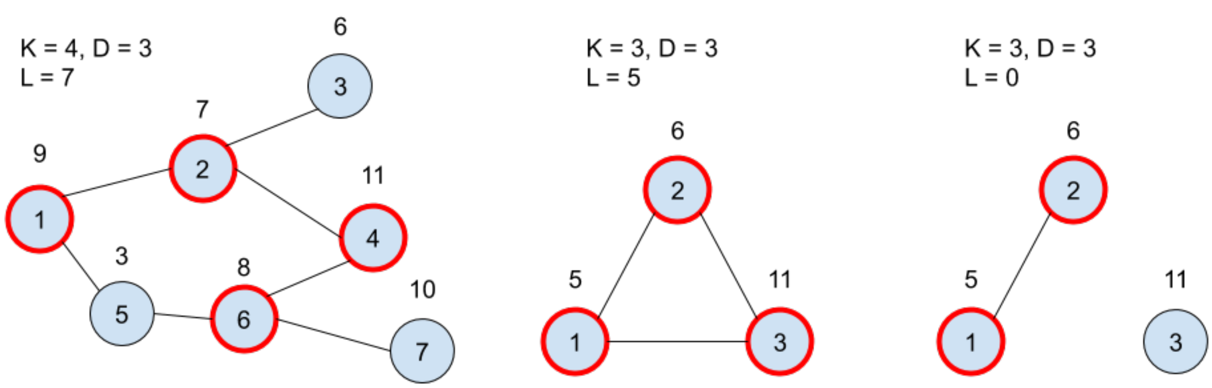
Sample Input 3

```
3 1 3 3
5 6 11
1 2
```

Sample Output 3

```
0
```

Explanation



Sample input 1 Sample input 2 Sample input 3

In all the images, each circle represents a radio station, the numbers inside each circle represent the station's number, and the number above the radio station represents its bandwidth. Lines are drawn in between pairs of radio stations with a direct radio link. Nodes outlined in red are nodes that can receive a radio message corresponding to the value of L given as the answer.

In sample input 1, with L = 7, one can reach all 4 radio stations outlined in red, which exactly satisfies k = 4. Notice how station 7 is too far away, it is 4 direct radio links away from node 1 as passing through station 5 is not allowed since the bandwidth of station 5 cannot support a message of length 7.

In sample input 2, all 3 nodes can be reached with a message of length 5. Note that a longer message cannot go through station 1.
This is an example of a case that could appear in subtask 2, 3 and 4.

In sample input 3, no matter how short you make the message, the message cannot reach k = 3 stations. Hence the answer is zero.
This is an example of a case that could appear in all 4 subtasks.

Constraints

- $1 \leq N \leq 10^5$
- $0 \leq M \leq 10^5$
- $1 \leq K \leq N$
- $1 \leq D \leq 10^5$
- $1 \leq b_i \leq 10^6$ for all i
- There exists at most 1 radio link between any pair of stations
- No radio link connects a station to itself.

Subtasks

- For Subtask 1 (30 points), $D = N$, and the answer is either 0, 1 or 2.
- For Subtask 2 (20 points), $D = N$, and the answer is less or equal to than 20.
- For Subtask 3 (30 points), $D = N$, and $N, M \leq 1000$.
- For Subtask 4 (20 points), no further constraints apply.