Problem Statement

In this problem, you will be given a directed unweighted graph **G** with **N** nodes (1 <= N <= 1000) and **E** edges (1 <= E <= 8000).

Input Format

- The first line of input will contain two integers **N** and **E**.
- The next **E** lines will each contain two integers **A** and **B**, representing a directed edge from node **A** to node **B**.
- After that, there will be a single integer **X** (1 <=X <= N), denoting a node from the given graph.

Output Format

- In the first line, print a single integer denoting the number of adjacent nodes of the given node **X**.
- In the second line, print **N** values, separated by a single space, where the **i-th** value denotes the minimum number of edges required to reach the **i-th** node. If a node is not reachable from **X**, the corresponding value should be -1. There should not be any leading or trailing spaces.

Constraints

- (1 <= N <= 1000)
- (1 <= E <= 5000)
- (1 <=X <= N)

Example

Input

5 7

1 2

1 4

2 3

2 4

3 4

3 5

4 5

1

Output

2

0 1 2 1 2