1. BreadthFirstPaths is an implementation of the Paths API that finds shortest paths for an undirected Graph G for all vertices, which runs in O(E + V) time.

Input:

First Line indicates the number of the Vertices (V).

Second Line indicates the number of the Edges (E).

Third Line indicates the source vertex (s).

Next E lines contain the edges between the vertices which are separated by space.

Output:

Print the distance from source vertex to all the vertices. Vertices and distance should be separated by colon. Vertices should be in increasing order.

Sample Test Case:

Input:

6

8

0

0 5

2 4

2 3

1 2

0 1

3 4

3 5

0 2

Output:

0:0

1:1

2:1

3:2

4:2

5:1