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E - A Path in A Dictionary

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 475 points

Problem Statement

You are given a simple connected undirected graph G with N vertices and M edges.

The vertices of G are numbered vertex 1, vertex 2, \dots , vertex N , and the i -th ($1 \leq i \leq M$) edge connects vertices U_i and V_i .

Find the lexicographically smallest simple path from vertex X to vertex Y in G .

That is, find the lexicographically smallest among the integer sequences $P =$

$(P_1, P_2, \dots, P_{|P|})$ that satisfy the following conditions:

- $1 \leq P_i \leq N$
- If $i \neq j$, then $P_i \neq P_j$.
- $P_1 = X$ and $P_{|P|} = Y$.
- For $1 \leq i \leq |P| - 1$, there exists an edge connecting vertices P_i and P_{i+1} .

One can prove that such a path always exists under the constraints of this problem.

You are given T test cases, so find the answer for each.

► Lexicographic order on integer sequences

2026-01-02 (Fri)

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Constraints

- $1 \leq T \leq 500$
- $2 \leq N \leq 1000$
- $N - 1 \leq M \leq \min\left(\frac{N(N-1)}{2}, 5 \times 10^4\right)$
- $1 \leq X, Y \leq N$
- $X \neq Y$
- $1 \leq U_i < V_i \leq N$
- If $i \neq j$, then $(U_i, V_i) \neq (U_j, V_j)$.
- The given graph is connected.
- The sum of N over all test cases in each input is at most 1000.
- The sum of M over all test cases in each input is at most 5×10^4 .
- All input values are integers.

Input

The input is given from Standard Input in the following format:

```
 $T$ 
case1
case2
⋮
case $T$ 
```

case _{i} represents the i -th test case. Each test case is given in the following format:

```
 $N$   $M$   $X$   $Y$ 
 $U_1$   $V_1$ 
 $U_2$   $V_2$ 
⋮
 $U_M$   $V_M$ 
```

Output

Output T lines.

The i -th line ($1 \leq i \leq T$) should contain the vertex numbers on the simple path that is the answer to the i -th test case, in order, separated by spaces.

That is, when the answer to the i -th test case is $P = (P_1, P_2, \dots, P_{|P|})$, output $P_1, P_2, \dots, P_{|P|}$ on the i -th line in this order, separated by spaces.

Sample Input 1

[Copy](#)

```
2
6 10 3 5
1 2
1 3
1 5
1 6
2 4
2 5
2 6
3 4
3 5
5 6
3 2 3 2
1 3
2 3
```

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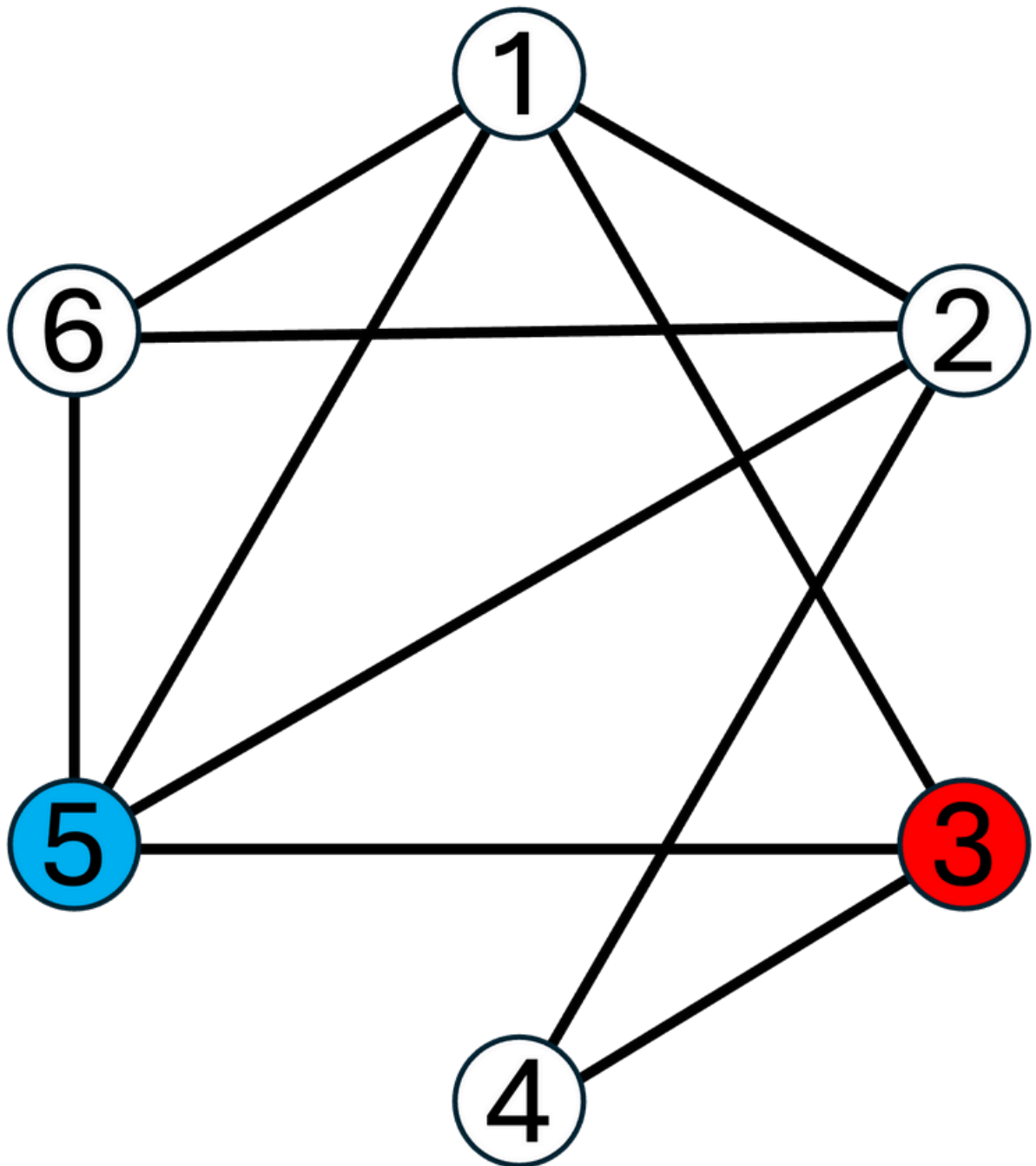
Sample Output 1

[Copy](#)

```
3 1 2 5
3 2
```

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For the first test case, graph G is as follows:



The simple paths from vertex 3 to vertex 5 on G , listed in lexicographic order, are as follows:

- (3, 1, 2, 5)
- (3, 1, 2, 6, 5)
- (3, 1, 5)
- (3, 1, 6, 2, 5)
- (3, 1, 6, 5)
- (3, 4, 2, 1, 5)
- (3, 4, 2, 1, 6, 5)
- (3, 4, 2, 5)
- (3, 4, 2, 6, 1, 5)
- (3, 4, 2, 6, 5)

- (3, 5)

Among these, the lexicographically smallest is (3, 1, 2, 5), so output 3, 1, 2, 5 separated by spaces on the first line.

For the second test case, (3, 2) is the only simple path from vertex 3 to vertex 2.

[/#telegram](#))

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