# 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 $2$, $\ldots$, 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 $P = (P_1, P_2, \ldots, P_{|P|})$ 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

## 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 $5 \times 10^4$.
- All input values are integers.

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## Input

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

$$
\begin{aligned}
&T \\
&\mathrm{case}_1 \\
&\mathrm{case}_2 \\
&\vdots \\
&\mathrm{case}_T
\end{aligned}
$$

$\mathrm{case}_i$ represents the $i$-th test case. Each test case is given in the following format:

$$
\begin{aligned}
&N \quad M \quad X \quad Y \\
&U_1 \quad V_1 \\
&U_2 \quad V_2 \\
&\vdots \\
&U_M \quad V_M
\end{aligned}
$$

## 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 $P = (P_1, P_2, \ldots, P_{|P|})$, output $P_1, P_2, \ldots, P_{|P|}$ on the $i$-th line in this order, separated by spaces.

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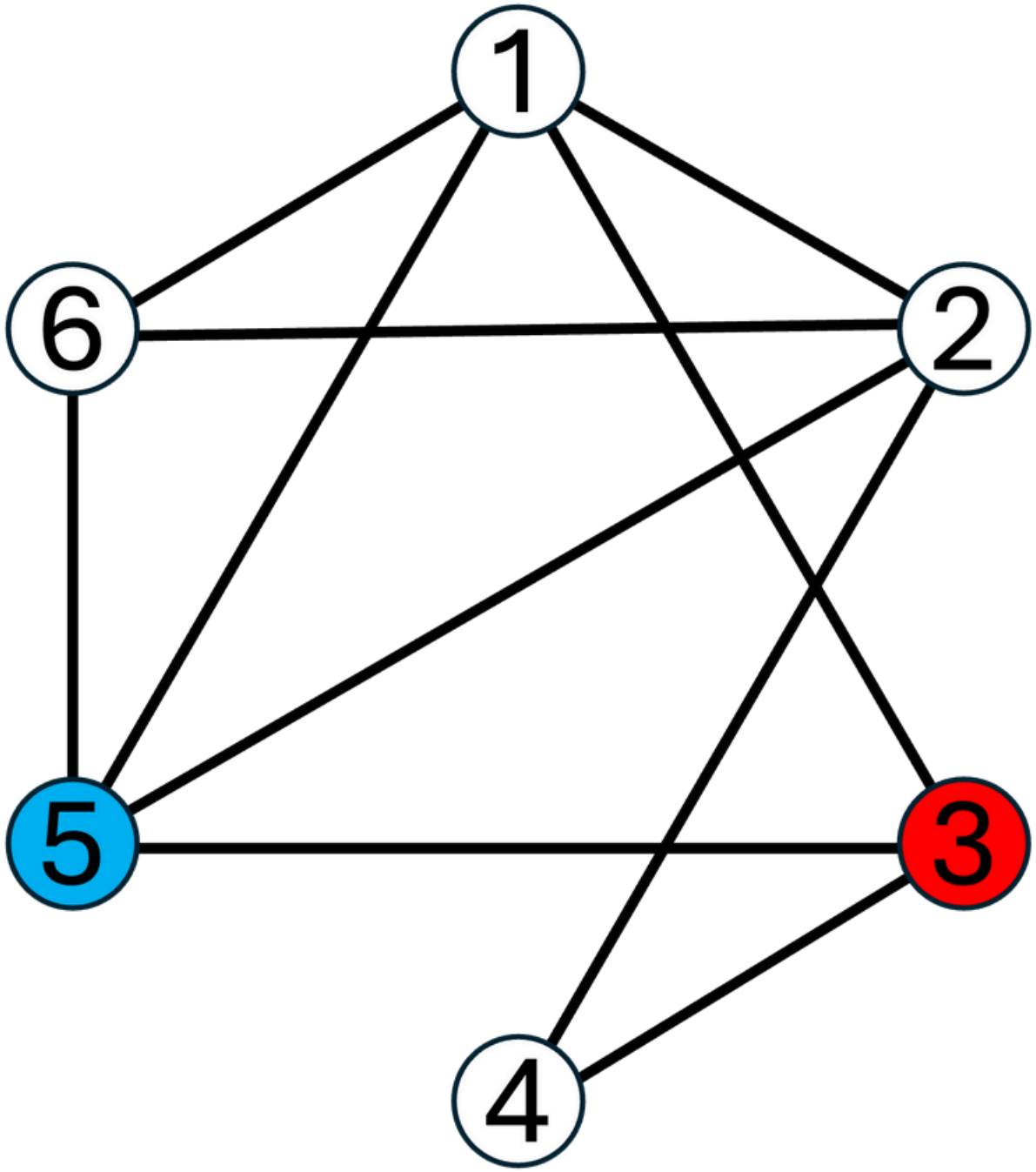
## Sample Input 1 Copy

```
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
```

## Sample Output 1 Copy

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

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:

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

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- $(3, 5)$

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 $2$.

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