Problem B
László Babai

Time limit: 1 second
Memory limit: 256 megabytes

Problem Description

> László Babai is a Hungarian computer scientist and mathematician. He is a Gödel prize winner and an outstanding researcher in the fields of the theory of computation, algorithms, combinatorics, and group theory. Last year, he proposed a subexponential-time algorithm solving Graph Isomorphism in $\exp((\log n)^{O(1)})$-time, and the best previous result is an $\exp(O(\sqrt{n \log n}))$-time algorithm.

Graph Isomorphism is a famous NP problem in theoretical computer science, however, you may wonder what it is. Let us explain for a bit. Given two undirected graphs $A = (V_A, E_A)$ and $B = (V_B, E_B)$, where A's vertex set is $V_A = \{a_1, a_2, a_3, \ldots, a_{n_A}\}$, and B's vertex set is $V_B = \{b_1, b_2, b_3, \ldots, b_{n_B}\}$. Graph A and B are isomorphic if and only if

1. A and B have the same amount of vertices and edges,
2. There exists a bijective (one-to-one and onto) function $f : V_A \to V_B$ such that $\{u, v\} \in E_A$ if and only if $\{f(u), f(v)\} \in E_B$.

In other words, we can relabel the vertex set of graph A to obtain graph B.

Graph Isomorphism is still neither known to be in P nor NP-complete. As up and coming computer scientists, we must be ambitious and never be afraid to dream big! Therefore, let us take on the challenge of testing if two 3-vertex undirected simple graphs G_1 and G_2 are isomorphic and show the world that we too can accomplish something.

Input Format

The first line of the input will be a single integer T ($T \leq 100$) representing the number of test cases that will follow.

Every test case then starts with the number of edges m ($0 \leq m \leq 3$) in the first undirected simple graph of 3 vertices (numbered from 1 to 3), followed by m lines each containing two distinct integers u, v ($u \neq v$, $u, v \in \{1, 2, 3\}$) indicating that there exists an edge between vertex u and v. You may assume that there is at most one edge between any pair of vertices. After that the description of the second graph follows in the same format.

Output Format

If the two graphs are isomorphic than output "`yes`" on one line. If not, output "`no`" instead.

Sample Input

```
3
3
1 2
2 3
3 1
3
1 3
2 1
3 2
2
1 2
1 3
0
1
2 3
1
1 2
```

Sample Output

```
yes
no
yes
```

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Problem Description

> László Babai 是位匈牙利計算機科學家以及數學家。他曾獲得哥德爾獎 (Gödel prize)，在計算理論、演算法、組合數學與群論等領域，他都有傑出的研究成果。去年，他提出了一個能在次指數時間內解決圖形同構問題的演算法。在那之前，最佳的結果是一個 $\exp(O(\sqrt{n \log n}))$ 時間的演算法，而 Babai 的新結果推進到了 $\exp((\log n)^{O(1)})$。

圖形同構 (Graph Isomorphism) 是計算機科學領域中的一個著名 NP 問題。或許你不知道那是什麼，讓我簡單解釋給你聽。給定兩個圖形 $A = (V_A, E_A)$ 、$B = (V_B, E_B)$，其中 A 的點集合 $V_A = \{a_1, a_2, a_3, \ldots, a_{n_A}\}$ 且 B 的點集合 $V_B = \{b_1, b_2, b_3, \ldots, b_{n_B}\}$。$A$ 和 B「同構」等價於下列兩個條件同時成立：

1. A 和 B 有相同數量的點與邊。
2. 存在一個對射 (一對一且映成) 函數 $f : V_A \to V_B$ 使得 $\{u, v\} \in E_A$ 若且唯若 $\{f(u), f(v)\} \in E_B$.

換句話說，我們能夠將 A 的點集重新編號，便可做出 B 來。

圖形同構問題仍然還不知道是否為 NP-complete 。作為下一代的電腦科學家，我們必須胸有大志，永遠不怕發大夢！就讓我們挑戰一下，判斷兩個僅有三點的無向簡單圖形，是否同構吧！告訴這個世界，我們也能有所成就！

Input Format

測試資料的第一行有一個整數 T ($T \leq 100$) 代表有 T 筆測試資料。

每一筆測試資料會以一個整數 m ($0 \leq m \leq 3$) 開始，代表圖形 A 有 m 條邊。接下來 m 行，每一行都有兩個相異整數 u, v ($u \neq v$, $u, v \in \{1, 2, 3\}$) 來描述有一條邊連接 u, v 兩個點。你可以假定任兩點間最多只有一條邊。測試資料中，剩餘的部份用相同的格式描述圖形 B。

Output Format

對每一筆測試資料，如果兩圖形同構，則輸出 `yes` ，否則輸出 `no` 。

Sample Input

```
3
3
1 2
2 3
3 1
3
1 3
2 1
3 2
2
1 2
1 3
0
1
2 3
1
1 2
```

Sample Output

```
yes
no
yes
```