Graph Diameter

Time Limit: 2 seconds

Problem Description

Given an undirected graph $G = (V, E)$ and a weight function $w : E \to \mathbb{Z}^+$. The length of a path $p = (e_1, \ldots, e_k)$ is define as $\sum_{i=1}^{k} w(e_i)$. The *diameter* $D(G)$ of G is the length of the longest shortest path between any pair of vertices. Formally, $D(G) = \max_{u,v \in V} d(u, v)$ where $d(u, v)$ is the length of the shortest path from u to v. Write a program to compute $D(G)$. Note: $D(G) = \infty$ if G is disconnected, and $d(v, v) = 0$ for every $v \in V$.

Technical Specifications

1. The number of test cases is no more than 20.
2. Basic: $1 \leq |V| \leq 30$, $1 \leq |E| \leq \binom{n}{2}$.
3. Hard: $1 \leq |V| \leq 300$, $1 \leq |E| \leq \min\left(10000, \binom{n}{2}\right)$.
4. $0 < w(e) \leq 1000$ for every $e \in E$.

Input Format

The first line of the input file contains an integer indicating the number of test cases. The first line of each test case contains two integers n and m where n is the number of vertices and m is the number of edges. For convenience, $V = \{1, \ldots, n\}$. The i-th of the following m lines contains three integers u, v, w indicating the i-th edge $e_i = \{u, v\}$ has weight $w(e_i) = w$. Note: the graph is undirected.

Output Format

For each test case, output $D(G)$ if $D(G)$ is finite. Output `Infinity` if $D(G) = \infty$.

Sample Input

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

Sample Output

```
1
5
Infinity
```