TC2017 Análisis y Diseño de Algoritmos
ProyE– Sparko's Birthday II (Tutoring 24/7)
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Forma de Trabajo: *Individual*.

Sparko's Birthday II

In BeagleTown live some beagles in their own doghouses, Prue who is the Sparko's girlfriend is preparing a birthday party for him, and she wants everybody in town be part of the party, but she is going to prepare a gourmet dinner and she needs to confirm the assistance of each one in BeagleTown, that why she needs to go to the doghouse of each one and return to her house to start to prepare the dinner as soon as possible. Help Prue to go to all the doghouses and return her doghouse in the shortest time. Prue lives in the doghouse A.

Input

The first line in the input contains two integers N, M(2<=N<=20, 1<=M <=5000), the number of doghouses (N) and the number of roads (M). Then came the M lines, one per road with 2 characters and integer that means the distance between those doghouses.

Output

Print a line containing the minimal distance that Prue needs to visit all the doghouses and return her doghouse.

Sample Input 1

```
4 5
A B 5
A C 10
A D 8
B C 2
C D 1
```

Sample Output 1

```
16
```

Sample Input 2

```
5 7
A B 4
A C 8
A D 2
```

B C 7
B D 2
C D 1
D E 3

Sample Output 2

INF

Sample Input 3

7 11
A B 2
A C 4
A D 6
B C 2
B E 6
C D 1
C E 3
D E 2
D F 3
E G 5
F G 4

Sample Output 3

25

Sample Input 4

5 10
A B 4
A C 8
A D 5
A E 3
B C 7
B D 2
B E 2
C D 1
C E 4
D E 3

Sample Output 4

14