Shopping

This question is graded for 1%!

Statement

Fluffy the Hamster is at the shopping mall today, with a shopping list of items to buy before he heads home. All the items he needs can be bought from shops in the mall. To not waste too much time, he wants to take the route between shops with the **minimum distance travelled**.

The mall can be represented as an (effectively infinite) flat 2D plane, with shops being zero-size points on this plane. Fluffy starts at position $(0, 0)$. There are no obstacles in the mall (not even the shops themselves), so the shortest path between 2 locations is the straight line linking them. Hence, the distance of that path, between places at $(x_1, y_1), (x_2, y_2)$ is

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Input

The first line consists of two integers `N M`, N being the number of items on the shopping list, and M being the number of stores in the mall.

M lines follow, each describing a shop. Each shop line contains 3 integers `X Y T`. `X,Y` denote the 2D Cartesian coordinates of the shop in the mall, while `T` is the type of item sold by the shop. (In other words, the shop sells the T-th item on the shopping list.)

Constraints

- $1 \leq N \leq M \leq 9$
- $1 \leq T_i \leq N$
- $-10^6 \leq X_i, Y_i \leq 10^6$
- Each item is sold by at least 1 shop.

Output

Print the minimum distance XXX needs to travel between shops, in order to obtain all items on his shopping list, to **3 decimal places**.

Important Note

For the purposes of this lab, your solution **must be recursive/have a recursive component**. Iterative/looping search of the possibilities is not allowed.

Examples

Sample Input	Expected Output

`2 3`
`1 0 1`
`5 0 2`
`-1 0 2`
	`3.0000`

`3 3`
`0 0 1`
`0 7 2`
`7 0 3`
	`16.8995`

In the first sample, the optimal route is to travel to the first shop for item 1, then backtrack to the third shop for item 2.

In the second sample, the actual value is $7(1+\sqrt{2}) \approx 16.8994949$, which is then rounded to 16.8995. This corresponds to visiting the shops in the given order. Note that since we start at $(0, 0)$, visiting the first shop (also at $(0, 0)$) does not add any distance.

Notes

1. A skeleton file has been given to help you. You should not create a new file or rename the file provided. You should develop your program using this skeleton file.
2. You are free to define your own helper methods and classes (or remove existing ones) if it is suitable but you must put all the new classes, if any, in the same skeleton file provided.

Skeleton File

You are given the skeleton file `Shopping.java`. You should see the following contents when you open the file:

```java
/**
 * Name          :
 * Matric. No    :
*/

import java.util.*;

public class Shopping {
    private void run() {
        // implement your "main" method here
    }

    public static void main(String args[]) {
        Shopping runner = new Shopping();
        runner.run();
    }
}
```