

Problem H Problem : Metro

Input file: [metro.in](#)
Output file: metro.out

The Cairo Metro Authority has asked you to write a program to compute the average time necessary to travel between any two metro stations in Cairo. You are given the number of stations; for every pair of stations that are directly adjacent, you are given the average time needed to travel from one station to the other. (Mathematically, this is a weighted undirected graph showing which stations are connected to which). Connections are assumed to be symmetric, i.e. the length of the connection from a to b will always be the same as the length from b to a. For every station in Cairo, you are to find the shortest path from this station to all other stations. You are then to find the average shortest path over the entire city.

There might be some pairs of stations that have no path between them; such pairs of stations should be excluded from the average computation.

Example

Suppose we have 7 stations {a,b,c,d,e,f,g} whose connections are shown in the following table:

A	a	2	5	--	--	--	g
B	b	2	3	4	--	--	f
C	c	5	3	--	1	2	e
D	d	--	4	1	--	--	d
E	e	--	--	2	--	--	c
F	f	--	--	--	--	--	b
G	g	--	--	--	--	3	a

Solution to Example

The following table shows the length of the shortest path between every pair of stations; note that some pairs of stations have no path between them:

a	a	--	2	5	6	7	f	g
b	b	--	2	3	4	5	--	--
c	c	5	3	--	1	2	--	--
d	d	--	4	1	--	3	--	--
e	e	2	3	--	--	--	3	--
f	f	--	--	--	--	--	--	3
g	g	--	--	--	--	--	--	--

The average shortest path length, over all pairs of stations which have paths between them, is 3.7272.

Input

The input file will consist of several problem instances. The first line of the file will include a single integer, indicating the number of problem instances that will follow. Each problem instance is structured as follows: the first line is an integer indicating the number of stations; the second line is an integer n indicating the number of connections m ; this is followed by m lines, each line representing a connection. Each connection consists of three integers: the first two integers representing the two stations numbers, and the third integer representing the length of the connection. The maximum number of stations in any problem instance will be 40. The maximum connection length in any problem instance will be 50.

Output

For each problem instance, your program should output a single line consisting of a single floating point number, representing the average length of the shortest path over all pairs of stations which have paths. This floating point number should be printed with exactly four decimal places; anything after the fourth decimal place should be truncated.

Sample Input

```

2
7
7
1 2
1 3
2 3
2 4
3 4
3 5
4 5
4 6
5 6
6 7
1 2 1
1 2 2
2 3 3
2 4 2
3 4 1
3 5 2
4 5 3
4 6 7
5 6 3
6 7 3
Sample Output
3.7272
2.0000

```