CENG 315
Programming Homework 6
Network Party

Due: Jan 9th, 2011 23:55

A non-profit organization wants to celebrate the 15th anniversary of the video game Duke Nukem 3D. They plan to setup a network with *N* computers and play the game for a full weekend. Although IBM sponsors the event, it will only provide the computers, but not the cabling.

Each computer that is donated by IBM will have *k* network adapters. It is planned to connect the computers directly to each other. The positions of the computers are fixed. In order to prevent people from tripping over network cables, some pairs of computers cannot be directly connected.

Your task is, given *k*, maximum number of connections per computer; *N*, number of computers; and a graph *G,* the possible direct connections and distances between the computers; find the minimum length of cabling required.

For your information, the problems maps to Degree Constrained Minimum Spanning Tree with degree k. Although the anniversary is on Jan 29th 2011, you need to finish your task earlier so that installation can take place.

Limits

Memory Limit = 64 Mb

Time limit = **1 second**

Number of computers: $1 <= N <= 15$

Number of edges in G: $0 <= M <= 25$

Maximum connections per computer: $1 <= k$

Input Specification

Input will be given from standard input. The first line will contain three integers, *N* (number of computers), *k* (number of network adapters per computer), and *M* (number of edges in graph *G*).

Each of the following *M* lines will contain three integers, A_i (index of first computer), B_i (index of second computer), and L_i (cable length needed in order to connect A_i and B_i). The connections are bidirectional. ($1 <= A_i, B_i <= N,\ 1 <= L_i$)

Output Specification

Output will be printed to standard output. You will only print a single number, T, that is the total length of cable needed. If the cabling cannot be done with the given input, you should output -1.

Sample Input

```
5 4 6
1 2 29
1 3 19
1 4 23
2 3 29
2 5 6
3 4 19
```

Sample Output

```
73
```

Submission / Grading

Submit your *hw6.c* / *hw6.cpp* files through COW. An autograder is available which will grade your homework with real inputs – the grade you get from autograder is final (see the exception below). You can use the autograder up to 3 times per day (so start early!).

Notice that there is a time limit – think about your algorithm's complexity before you code.

Deadline is Jan 9th, 23:55. Late submission is not allowed.

All work should be done individually. We will check your homeworks for cheating/plagiarism after the due date – in case you cheat, you will get 0 from all your homeworks and disciplinary action will be taken.