

**BITS Pilani K.K. Birla Goa Campus**

**CS F364 : Design and Analysis of Algorithms (Submission Deadline 21/02/2014)**

Assignment 1

Problem Statement:

The Byteland (City of Programmers) has organized a racing game. All participants in the race start from the given start point **S** and reach to the given target point **T**. Certain points on the race track have flags. During the race all participants has to collect at least one flag from those flag points.

Alice is also participating in the race. She somehow managed to get the information about the locations of the flag points and the possible target point. She needs your help to figure out the length of the shortest possible route from the starting point to the target point via at least one of the flag points.

There are **N** points (indexed 0 to N-1) on the racetrack and **M** roads joining some of them. Each road on the race track joins two points. Each road are of different length. All the roads are one way roads (To avoid accidents during race) (i.e. A road from node X to Y can not be used to run from Y to X). However there might be several roads joining any two points on the race track.

Help Alice by giving shortest possible route length for the given start and target points.

Input:

First line of the input contains four space separated integers **N, M, F, S** .

Next **M** lines of the input contains description of the roads. Each line has three space separated integers **i, j** and **c**. Denoting a road from point **i** to point **j** having cost **c**.

Next line contains **F** space separated integers denoting the locations of flag points.

Next line contains an integer **P** denoting number of possible target points.

Next **P** lines contains a possible target point **T**.

Output:

Print **P** lines for each of the possible target **T**, the length of the shortest path from **S** to **T** via at least one flag point.

Constraints:

$$3 \leq N \leq 1000$$

$$2 \leq M \leq 100000 (10^5)$$

$$1 \leq F \leq N-2$$

$0 \leq i, j, S, T \leq N-1$

$0 \leq c \leq 1000000000000 (10^{12})$

$1 \leq P \leq 100$

There will be at least one route satisfying given criteria (From S to T via at least one flag point).

Start point will not be a flag point.

Target point may be a flag point.

Time Limit: 1s (for each input file).

Source Code file size must be less than or equal to 5000 bytes.

Online judge:

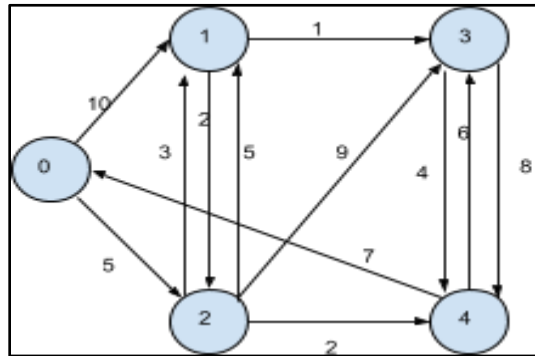
Mooshak v 1.5.2      Compilation : gcc \$file -Wall -lm      Accepted file extensions : .c  
gcc version : 4.3.2

Sample Input:

```
5 12 2 0
0 1 10
0 2 5
1 3 1
1 2 2
2 1 3
2 1 5
2 3 9
2 4 2
3 4 4
3 4 8
4 3 6
4 0 7
1 3
2
4
2
```

Sample Output:

```
12
10
```



### Explanation:

Given starting point is 0 and target points are 2 and 4. 1 and 3 are flag points.

As seen in the map the shortest routes are 0-2-1-2-4 and 0-2-1-2 respectively. (Points may repeat in the route). Both passing through flag point 1 going through smallest routes from point 2 to 1.

### Dos and Don'ts

#### Dos

- Print the output in the given format only. Your code will be evaluated on an online judge, so any mismatch in the output will result in a wrong answer.
- Indent your code properly. Make your program as readable and understandable as possible. There are credits associated with programming style as well !!!
- Write appropriate comments for each method you use in your code describing precondition, postcondition, parameters and return value. Also write comments inside the method to describe its functionality whenever necessary. (We need to know what you are doing or trying to do ... :))
- Refer to tutorials on the internet about standard variable naming practices.
- Make sure your main function returns 0. Otherwise it will cause a runtime error on the online judge.

#### Don'ts

- Do not discuss your strategy/Algorithm with other teams.
- Your program should not have any unused/unnecessary variables. It generates warnings while compiling and is treated as a compilation error on the online judge. Use the above compilation command while testing on your machine.

### Submission file naming:

Your submission file should be <concatenated last 3 digits of id numbers of all team members>.c

for example if a team has members with id numbers 2011A7PS007G, 2011A7PS123G and 2011A7PS556G then the file name should be 007123556.c

Submission link: will be given later.