CMSC 401 – Fall 2020

Programming Assignment 3 (due Sun, 11/8 – 11:59pm)

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CMSC 401- Algorithm Analysis with Advanced Data Structures

VCU College of Engineering

Best Road Trip

- You are planning to drive from Richmond to L.A.
- You want to spend as little as possible on the gas and motels.
- So you need to pick the best route – with cheapest motels and smallest cost of gas
- You have done your research and you know:
  - cost of an overnight stay in the cheapest motel in each of the cities on the possible routes
  - cost of driving between cities without overnight stays
- Now you need to write a program that will take all that data, and find the cheapest route
  - The route with lowest sum of motel and gas costs

Assignment 3

- Write a program cmsc401.java that reads the database of gas & motel costs, which is in the format below:
  - The number of cities, N, in the first line. N>=3, N<=1000
  - The total number of direct highways between cities, M, in the second line. M>=2, M<=10000
  - Lowest motel price for each of N-2 cities (excluding L.A. and Richmond), each as a single line of two numbers: city number (3...N), motel cost (1...200)
  - Gas prices for traveling direct highways between two cities, each as a single line of three numbers: city number (1...N), city number (1...N), cost of gas for travel between the two cities (1...200)
  - Richmond is city number 1, L.A. is city number 2
  - Cost shouldn't include a motel in Richmond and in L.A.

```
5
7
3 78
4 87
5 98
1 4 98
5 4 45
1 5 140
4 3 87
2 5 150
3 5 109
3 2 73
```

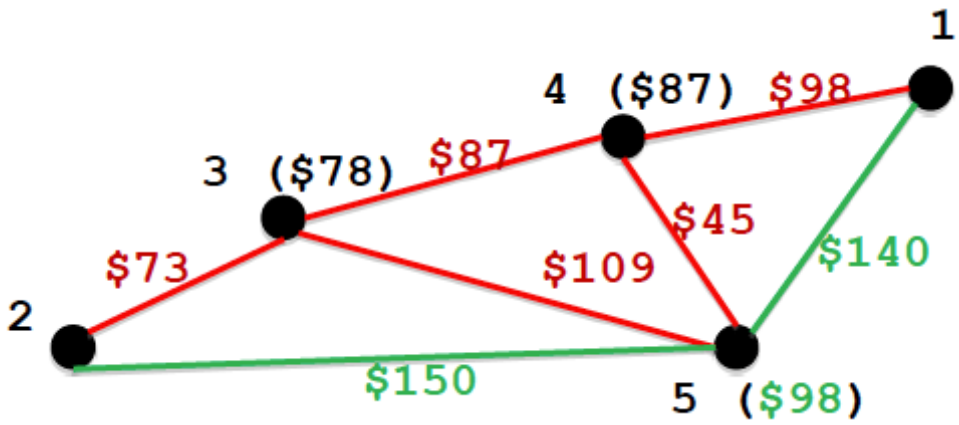
Example

Input in correct format

```
5
7
3  78
4  87
5  98
1  4  98
5  4  45
1  5  140
4  3  87
2  5  150
3  5  109
3  2  73
```

Correct output

388



Green shows the cheapest route from city 1 (Richmond) to city 2 (L.A). Cost is $388: $140+$150 for gas + $98 for motel

Remarks

- There will always be at least one way of getting from city 1 to city 2
- If a cost for gas from city A to B is in the input, cost for gas from B to A is the same and will not be in the input
- No other text, comments, questions on output (you will lose points, if provided)

Constraints

- Any Java libraries, classes, functions related to graphs, vertices, edges are NOT allowed
  - Create your own…
- Using Java queue or priority queue (and other simple data structures such as lists, hash maps) is allowed

Submission

- **Date due:** Sunday, Nov 8th, 11:59 pm
- Upload through Blackboard
  - Your submission should be a zip archive 3_FamilyName_FirstName.zip containing
    - Java source code in a single file cmsc401.java **(all lower case letters!)**
    - The file should have *your name* in a comment in the first line
    - Remember: in Java, class name should match the file name, and is case sensitive
- Please do NOT create your own packages
- Do NOT place the file into a folder – just zip the file
- Use standard I/O to read input (System.in, System.out) and output
- Make sure **the program compiles and WORKS!**
- Late submissions are accepted up to 2 days!