Problem 1

- The function reads input from input.txt file and output is written to output.txt
- For each number present in input file, three operations are done:
    - Conversion from string to integer
    - Sum of digits of integer is calculated
    - Next we check if the sum is prime
- The numbers with prime sum are written to the output file
- P.S. an input file is provided with the code, it contains the roll numbers of all the students of CSE ’13 batch

Problem 2

Two files are provided 2-1.lisp and 2-2.lisp:

- First evaluates the Simpson integral for each of the design and outputs the minimum area using Simson’s method
- Second evaluates the Trapezoidal integral of the designs and give the output
- To evaluate limits of the integral of *f(x)* from a to b using n+1 discrete points, following formulas are used:
    - $\int_a^b f(x)\,\mathrm{d}x \approx \frac{\Delta x}{3}(y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 + ... + 4y_{n-1} + y_n)$. in Simpson method
    - $\int_a^b f(x)\,\mathrm{d}x \approx \frac{\Delta x}{2}(y_0 + 2y_1 + 2y_2 + 2y_3 + 2y_4 + ... + 2y_{n-1} + y_n)$ in Trapezoidal method

Problem 3

We were given a representation of a section of IIT Guwahati map and depending upon the real time restrictions, we had to suggest the shortest path between two points of graph. We used Bellman-Ford algorithm to compute the shortest path between two points of a graph.

3.1 Restrictions

The edges (roads) of the graph (map of the campus) at a time allow one way traffic only, i.e., either left-to-right or right-to-left. The distances between two points are mentioned in the graph given in the problem.

3.1 Assumptions

- The road restrictions doesn’t change after a student has left their hostel to meet their friend.
- We take the real time input of restrictions from a file.
- For each edge, we assume a single direction constraint i.e., during the live stream of constraint only one directional movement is allowed.

- Pair of points that are very close and doesn't have their distance mentioned are assumed to be 2m apart. Such, Dihing and Brahmaputra, Bus-Stop and T-point near Kameng hostel.
- For Kapili and Dibang as they face each other directly, we have assumed a distance of 1 m between them which is taken into account only when we traverse from Kapili to Dibang or vice-versa.

3.3 Restriction Scenarios

Our code is capable of taking any input restriction on any edge, but still we have tried to give a sample text files for inputs in some restriction scenarios

3.3.1 test1.txt

This restriction enforces edge traversal from lower index point to higher index point in that order

3.3.2 test2.txt

This restriction enforces edge traversal from higher index point to lower index point in that order

3.3.3 test3.txt

A mixture of both high to low and low to high.

We can try out any other cases also, the code gives an output if path exists else, it prints that "Destination cannot be reached"

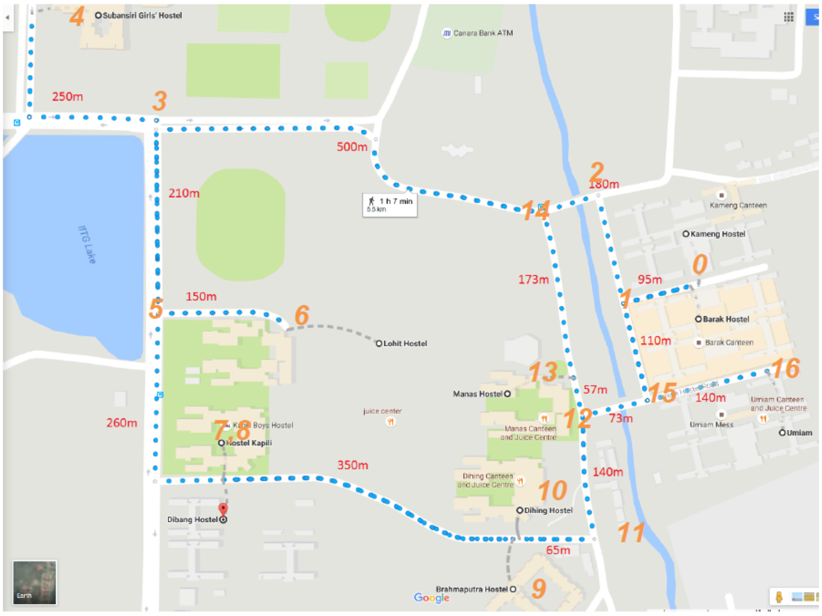
3.4 Limitations

The program returns no path in following cases.

- The input directed graph is disconnected.
- Say, hostel X's resident wants to leave to meet someone. But X's edges are all incident edges.
- In another case, if a student wants to visit hostel Y, but Y has all outgoing edges.

Note: These limitations arise as a result of the constraints enforced and not for the lack of algorithm.

P.S. **Consider the following for numbering of nodes used in the code file:**


4
Subansiri Girls' Hostel
Canara Bank ATM
250m
3
500m
210m
1 h 7 min
5.5 km
2
180m
14
Kameng Canteen
Kameng Hostel
IITG Lake
173m
95m
0
1
150m
5
6
Lohit Hostel
Barak Hostel
110m
Barak Canteen
13
16
57m
Manas Hostel
15
140m
juice center
12
73m
Umiam Canteen
and Juice Centre
Umiam Mess
Umiam
260m
7,8
Kapili Boys Hostel
Hostel Kapili
350m
Manas Canteen
and Juice Centre
140m
Dihing Canteen
and Juice Centre
10
Dihing Hostel
Dibang Hostel
11
65m
Brahmaputra Hostel
9
Google
Earth