Homework VI

Task 1

Description

In this problem, you need to make research to compare the working time of Bellman Ford algorithm, Dijkstra algorithm, and write a report based on the results you will get. You are not given input or output format, or any template, so you can choose any you want to. **You need to implement Bellman Ford and Dijkstra algorithms (if you implement Dijkstra using binary heap you will get extra points), write a tester, measure the time of working, and write a report.**

Your work should consist of two parts:

1) A .cpp file contains algorithms and code that measures working time.
2) A report where you analyse and prove time complexity for the each algorithm and explain the results you get. A .cpp file must be runnable and reproduces the results you describe in the report.

Homework VI

Task 1

What you have to do step by step for the first part:

1) Implement **Bellman Ford** algorithm and **Dijkstra** algorithm (the **version** with a binary heap will bring you additional points).

The first version of dijkstra you need to implement is the same as dijkstra - I problem in the 3rd yandex contest, the second version of dijkstra is the same as dijkstra-II problem.

2) **Write code** that measures the working time of the each algorithm.

3) Save code from previous steps in a .cpp file.

…. (see the next silde)

Homework VI

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What you have to do step by step for the second part:

4) Analyse and **prove** the time complexity for each of the algorithms, **compare** the working time of algorithms you implemented and explain it

In your report you **have to answer** the following questions:
4.1) What is the time complexity of **each** version of the algorithm? **Why?**
4.2) What is the working time of each version of the algorithms on **different inputs**? Try **small** and **big** graphs, **dense** and **sparse** graphs.
4.3) What **graphs size** you can see the **difference** in working time for each of the algorithms?

5) **Write down** your thoughts and answers in a report file. You can choose any format you want to.

6) **Create a folder** with the code file and the report file, **archive** it as **.zip** and **send** as an email with attachments to anukhinm@gmail.com . Remember to write your name!

Homework VI

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The evaluation rules

The deadline for the problem is **30 November 23:59**. The deadline will be count by the time of your **last email sending**.

Your work will be evaluated based on your **code style** *(0.25 points)*, **code structure** *(0.65 points)*, **correctness** *(0.1 points),* and the completeness of the report you write *(1 points).*

There will be no personal code review for the problem. The variant you sent to my email is the final version, you can’t change it later.