Week 8: Lecture 15 - Lecture 16

Lecture 15

#graph

Dijkstra's algo

// code implementation with priority queue

// code implementation without priority queue

Problem 1

Problem - 20C - Codeforces

Problem 2

CSES - Flight Discount

idea: use Dijkstra's algo to find the min cost route. Then half the most expensive flight on the route.

Actually this idea doesn't work.

Counter example: there are two routes from source to destination

Route 1:

Src ➜ A ➜ B ➜ dst

Cost (src, A) = 4

Cost (A, B) = 2

Route 2:

Src ➜ dst

Cost (src, dst) = 5

By the idea we would have chosen route 1 and half the route from src to A, which gives final result = 2 + 2 = 4

However if we just half cost (src, dst), we would have gotten 2 instead.

Soln:

- Run Dijkstra from src ➜ dst
- Create reverse graph G'. Run Dijkstra from dst ➜ src
- for each edge e (u, v), half the cost (u, v). Find out cost from src ➜ u in G and cost from v ➜ dst in G'
- Take the min over all possible results