D. Delivery Route Through Priority Corridors

Constraint: Time Limit: 3 seconds, Memory: 256MB

Background

SkyRoute logistics company manages a delivery system in a large metropolitan area with various road types.

The city categorizes roads into two types:

- **Regular roads** (t=0): No permit required, but typically take more time due to slow speeds or traffic congestion
- **Priority roads** (t=1): Urban expressway lanes, high-speed tunnels, overpasses... that enable faster travel but require special permits

Due to costs and regulations, each truck is granted **a maximum of K permits** to use priority roads during a single delivery trip.

Problem

Given a directed graph with **n** locations and **m** roads. Each road connects from location u to location v, with:

- Travel time: **w** (seconds/minutes)
- Road type: **t** (0 = regular road, 1 = priority road)

Requirement: Find the **minimum travel time** from central warehouse **s** to delivery destination **t**, such that **no more than K priority roads are used**.

If no valid route exists, output **-1**.

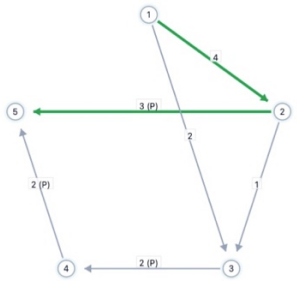
Input/ Output Format

Input	Output
Line 1: 5 integers `n m K s t` • n: number of locations ($1 \le n \le 2\times10^5$) • m: number of roads ($1 \le m \le 4\times10^5$) • K: maximum number of priority roads allowed ($0 \le K \le 30$) • s: starting location ($1 \le s \le n$) • t: destination location ($1 \le t \le n$) **Next M lines:** Each line describes a road: `u v w type` • u, v: directed road from u to v ($1 \le u, v \le n$) • w: travel time ($1 \le w \le 10^9$) • type: road type (0 = regular road, 1 = priority road) **Note:** There may be multiple roads between the same pair of locations.	A single integer: • The minimum travel time if a valid route exists • **-1** if it's impossible to reach the destination with the allowed number of permits

Example

Input	Output
5 6 1 1 5 1 2 4 0 2 5 3 1 1 3 2 0 3 4 2 1 4 5 2 1 2 3 1 0	7

The graph has 5 locations and 6 roads. Starting from location 1, need to reach location 5, allowed to use **at most 1 priority road**.



Priority roads (type=1):

- 2→5 (time 3)
- 3→4 (time 2)
- 4→5 (time 2)

Route analysis:

1. **Route 1→3→4→5:**
   - Time: 2 + 2 + 2 = 6
   - Number of priority roads: 2 (edges 3→4 and 4→5)
   - **Invalid** (exceeds K=1)
2. **Route 1→2→5:**
   - Time: 4 + 3 = 7
   - Number of priority roads: 1 (edge 2→5)
   - **Valid**
3. **Route 1→2→3→4→5:**
   - Time: 4 + 1 + 2 + 2 = 9
   - Longer than route 1→2→5

Result: The optimal route is 1→2→5 with total time **7**.