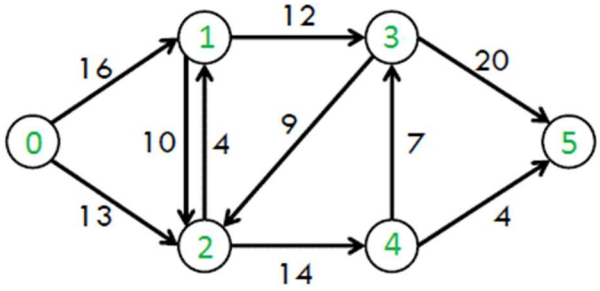
U. Network Flow Optimization

Time Limit: 3 seconds



Problem description

In the city of Imaginaria, there exists a transportation system consisting of multiple roads and intersections. Each road segment connects two intersections and has a capacity representing the maximum flow it can handle within a certain time frame. You have been tasked with optimizing the traffic flow in this system to ensure efficient movement of vehicles from one area to another.

Your task:

Read an integer N - the number of intersections

Read an integer M - the number of road segments connecting the intersections.

Read information about the road segments, including:

Source intersection s.

Destination intersection t.

Capacity of the road segment.

Develop a program to calculate the **maximum flow** in this transportation system, starting from intersection s and ending at intersection t.

Print the value of the maximum flow, optimizing the traffic flow in the system.

Compute and print the **minimum cut set**[1] in the transportation system, which includes a list of road segments and intersections such that if you block flow through them, the maximum flow will be restricted.

[1] In the maximum flow problem, computing the minimum cut refers to identifying a subset of road segments and intersections in the transportation system. This subset is chosen in such a way that if you were to block the flow through these road segments and intersections, it would result in a restriction or reduction in the maximum flow within the transportation system.

In simpler terms, the minimum cut represents a set of roads and intersections that act as bottlenecks or critical points in the network. If you were to block any of these roads or intersections, it would limit the maximum amount of flow that can pass through the system.

INPUT	OUTPUT
First line: an integer N - the number of intersections. N <= 10^6 Second line: an integer M - the number of road segments connecting the intersections. M <=10^6 Next M lines: store information of the road segments, including: Source intersection s, Destination intersection t, and Capacity of the road segment. Value of each <= 10^6	First line: store the maximum value of **maximum flow**[2] Second line: store list of **minimum cut set**

Example 1

INPUT	OUTPUT
4 5 0 1 8 0 2 5 1 2 4 1 3 4 2 3 7	9 0 1

Example 2:

INPUT	OUTPUT
5 7 0 1 10 0 2 5 1 2 15 1 3 10 2 3 10 2 4 20 3 4 10	15 0 1 2

The concept of a minimum cut is used to understand the vulnerabilities or key points in the network where reducing capacity can have the most significant impact on controlling or limiting the flow of traffic or resources. This information is valuable for network optimization and management.

[2] It represents the maximum amount of flow or data that can be sent from a source node to a sink node in a directed flow network while respecting the capacity constraints of the network's edges (arc capacities)