United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

CSE 2218: Data Structure and Algorithms II Lab

Section: K

Assignment

Question: 01 Marks: 10

Bangladesh elections are coming. Usually "Party A", the ruling party, takes all the seats in the Parliament to ensure stability and sustainable development. But this year there is one opposition candidate in one of the constituencies. Even one opposition member can disturb the stability in the Parliament, so the head of the Party asks you to ensure that the opposition candidate will not be elected.

There are **n** candidates, numbered from **1** to **n**. Candidate n is the opposition candidate. There are **m** polling stations in the constituency, numbered from **1** to **m**. You know the number of votes cast for each candidate at each polling station. The only thing you can do to prevent the election of the opposition candidate is to cancel the election results at some polling stations. The opposition candidate will be elected if the sum of the votes cast in their favor at all non-canceled stations will be strictly greater than the analogous sum for every other candidate.

Your task is to prevent the election of the opposition candidate by canceling the election results at the minimal possible number of polling stations. Notice that a solution always exists, because if you cancel the elections at all polling stations, the number of votes for each candidate will be 0, and the opposition candidate will not be elected.

Input Format:

The first line of the input contains two integers **n** and **m (2 ≤ n ≤ 100; 1 ≤ m ≤ 100)** — the number of candidates and the number of polling stations. The next m lines contain the election results at each polling station with n numbers on each line. In the **i**-th line, the **j**-th number is $\mathbf{a}_{i,j}$ — the number of votes cast for the candidate **j** at the station i ($0 \le \mathbf{a}_{i,j} \le 1000$).

Output Format:

In the first line output integer k — the minimal number of the polling stations in which you need to cancel the election results. In the second line output k integers — the indices of canceled polling stations, in any order. If there are multiple ways to cancel results at k stations, output any one of them.

Sample Input	Sample Output
5 3 6 3 4 2 8 3 7 5 6 7 5 2 4 7 9	2 3 1
2 1 1 1	0
3 3 2 3 8 4 2 9 3 1 7	3 1 2 3

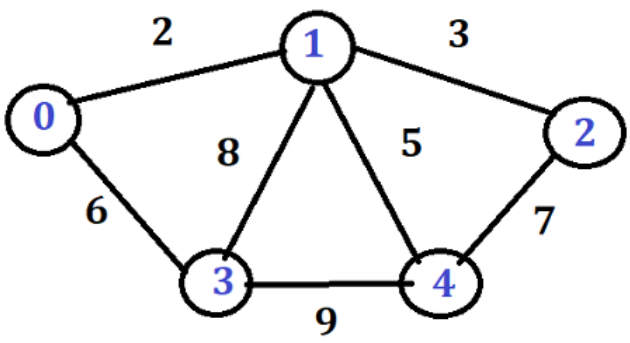
Explanations: In the first example, the candidates from 1 to 5 received 14, 12, 13, 15, and 24 votes correspondingly. The opposition candidate has the most votes. However, if you cancel the election results at the first and the third polling stations, then only the result from the second polling station remains and the vote sums become 3, 7, 5, 6, and 7, without the opposition candidate being in the lead anymore.

Question: 02 Marks: 10

Given a connected, weighted, and undirected graph, you need to find a spanning tree with a weight product less than or equal to the weight product of every other spanning tree. The weight product of a spanning tree is the product of weights corresponding to each edge of the spanning tree. All weights of the given graph will be positive for simplicity.

Remember that, a spanning tree of a graph is a subgraph that is a tree and connects all the vertices together.

For example, the minimum weight product is 180 for the below graph, by choosing 0-1, 1-2, 0-3, and 1-4.



Input Format:
The first line contains two integers **n** and **m (1 ≤ n,m ≤ 10^5)** — the number of vertices and the number of edges in a graph. Each line of the next **m** lines contains three integers **u,v,** and **w** — the end vertices of an edge and the weight of the edge.

Output Format:
Print the edges of that special spanning tree and the minimum product of the weights.

Sample Input	Sample Output
5 7 0 1 2 0 3 6 1 2 3 1 3 8 1 4 5 2 4 7 3 4 9	Edges: 0 — 1 1 — 2 0 — 3 1 — 4 Minimum product: 180

Instructions

● Name the code files as **`Q1`** and **`Q2`**, and place both **`.cpp`** files inside a folder named **`<YourID>`**
● **Zip** the folder and submit it.
● If you are found guilty of copying from **ChatGPT** or your **friend(s)**, you will receive a **-100% mark** on the assignment as a penalty.
● Also, you will have a **viva on this assignment** during your **final exam evaluation time**.