Problem A. Hill

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

Amanbol has a table A of size $n \times m$. The rows of the table are numbered from 1 to n, and the columns are numbered from 1 to m. Each cell of the table either contains the character `'X'`, or one digit from `'0'` to `'9'`.

If the symbol `'X'` is written on a table cell, it means that Amanbol marked this cell as *blocked*. Otherwise, the number written on this cell denotes its *value*.

After a recent hike in the mountains, Amanbol wants to find a *hill* in his table. He defines a *hill* as follows:

1. First we choose two numbers (s, e) such that $(1 \le s \le e \le n)$.
2. Then for each k $(s \le k \le e)$ we choose a pair (L_k, R_k) such that $(1 \le L_k \le R_k \le m)$.
3. The conditions $L_s \ge L_{s+1} \ge \ldots \ge L_e$ and $R_s \le R_{s+1} \le \ldots \le R_e$ should be satisfied.

Let's say that a cell (x, y) belongs to a hill if $s \le x \le e$ and $L_x \le y \le R_x$. Among all possible hills, Amanbol wants to find the one **with no blocked cells** and the total value of all its cells is maximum. Help him with this task!

Input

The first line of the input contains two integers n and m $(1 \le n, m \le 2500)$ — the number of rows and columns in table A.

The i-th of the next n lines contains exactly m characters $A_{i,1}, \ldots, A_{i,m}$.

It is guaranteed that each table cell is a character `'X'` or a digit from `'0'` to `'9'`. It is also guaranteed that it is always possible to find at least one hill in the table.

Output

Print a single integer — the maximum possible total value of all cells of the hill.

Scoring

This task contains 5 subtasks.

Subtask	Additional restrictions	Points	Required subtasks
0	Examples	0	—
1	$n = 1$	12	—
2	No blocked cells	7	—
3	$n, m \le 50$	25	0
4	$n, m \le 300$	22	3
5	—	34	1, 2, 4

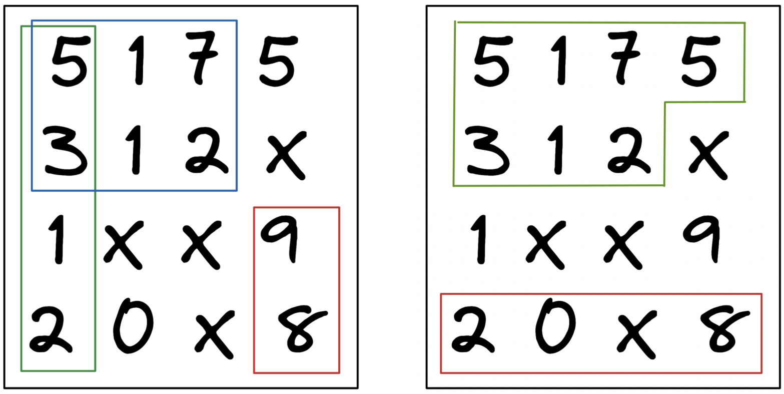
Examples

standard input	standard output

`4 4`
`5175`
`312X`
`1XX9`
`20X8`
	`19`

`1 6` `1X23X4`	`5`

Note



First example

In the first example, for instance, the following hills are possible:

1. Let's choose $s = 3, e = 4$. Then choose $(L_3, R_3) = (4, 4)$ and $(L_4, R_4) = (4, 4)$ (marked in red in the first image). The total value of the cells of this hill is $9 + 8 = 17$.
2. Let's choose $s = 1, e = 4$. Then choose $(L_k, R_k) = (1, 1)$ for all k $(1 \leq k \leq 4)$ (marked in green in the first image). The total value of the cells of this hill is $5 + 3 + 1 + 2 = 11$.
3. Let's choose $s = 1, e = 2$. Then choose $(L_1, R_1) = (1, 3)$ and $(L_2, R_2) = (1, 3)$ (marked in blue in the first image). The total value of the cells of this hill is 19.

And the following hills, for example, are invalid:

1. Let's choose $s = 1, e = 2$. Then choose $(L_1, R_1) = (1, 4)$ and $(L_2, R_2) = (1, 3)$ (marked in green in the second image). This hill is invalid because the condition $R_1 \leq R_2$ is not fulfilled.
2. Let's choose $s = 4, e = 4$. Then choose $(L_4, R_4) = (1, 4)$ (marked in red in the second image). This hill is invalid because the hill contains a blocked cell $(4, 3)$.

It can be shown that among all possible hills, the maximum total value of cells will be equal to 19.

Problem B. Two tree

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	512 megabytes

Temirlan, as a true friend, gave Dimash two trees. These trees, however, were not the usual trees you might encounter but two undirected connected graphs without cycles. Each tree has n nodes which are numbered from 1 to n.

Dimash has chosen the node v $(1 \le v \le n)$, and rooted both trees on that node. After that, he determined the value $sub_1(x)$ — the number of nodes in the subtree of node x in the first tree, and the value $sub_2(x)$ — the number of nodes in the subtree of node x in the second tree. Then he determined the *difference* of the trees as the number of nodes x $(1 \le x \le n)$ such that $sub_1(x) > sub_2(x)$.

Recall that the *subtree* of a node in a rooted tree is a part of tree consisting of this node and all its descendants. In other words, *subtree* of a node x is formed by nodes i, such that node x is present on the path from the root of the tree to the vertex i.

For every node v $(1 \le v \le n)$, Dimash wants to find the *difference* of the trees, if both trees were to be rooted on this node v. Help him with this!

Input

The first line of the input contains one integer n $(1 \le n \le 5 \cdot 10^5)$ — the number of nodes in the tree.

Then $n - 1$ lines follow, each of them contains two integers u and v $(1 \le u, v \le n)$ which describe a pair of nodes connected by an edge in the first tree.

Then $n - 1$ lines follow, each of them contains two integers u and v $(1 \le u, v \le n)$ which describe a pair of nodes connected by an edge in the second tree.

Output

Print n space-separated integers, the i-th number is the *difference* of trees, if both trees are rooted on node i.

Scoring

Subtask	Additional restrictions	Points	Required subtasks
0	Examples	0	—
1	$n \le 2000$	12	0
2	$n \le 100000$	22	1
3	Every node has at most two neighbors	23	—
4	Both trees are complete binary trees	17	—
5	—	26	2, 3, 4

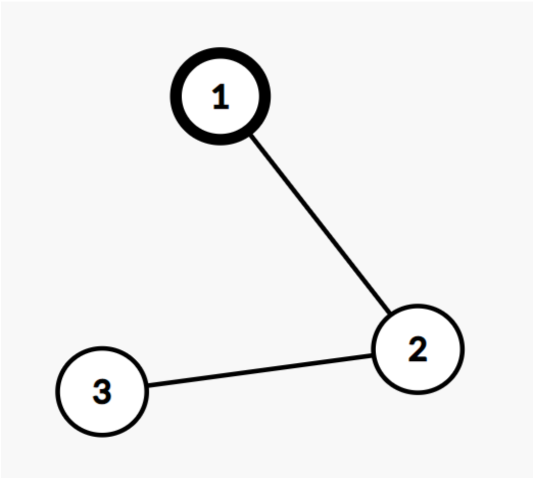
Recall that complete binary trees are trees where each vertex, except for leaves, has exactly two child vertices, and all leaves are at the same depth.

Examples

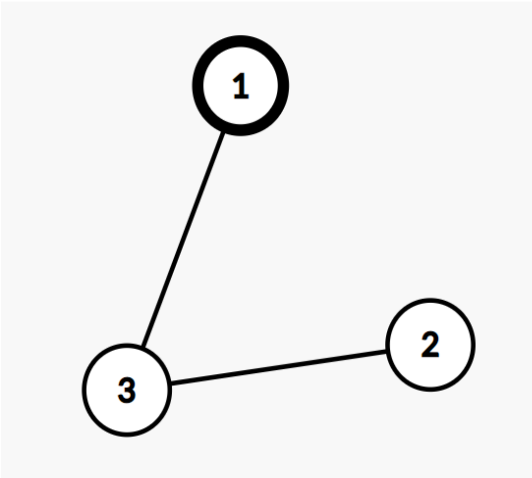
standard input	standard output
3 1 2 2 3 1 3 2 3	1 0 1
5 1 4 2 4 3 2 3 5 3 1 2 3 5 2 4 2	1 1 1 0 2

Note

In the first example, when both trees are rooted on node 1, values of sub_1 are $[3, 2, 1]$ and values of sub_2 are $[3, 1, 2]$. Only for node 2 the condition $sub_1(2) > sub_2(2)$, in other words $2 > 1$, is satisfied. That is the why answer is 1.



First tree



Second tree

Problem C. Golf

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Batyr came up with a way to play golf on a directed graph, but a directed gaming graph is required for this.

We refer to a directed graph as a gaming graph if:

1. A graph consists of at least 3 vertices, where the first and second vertices are terminal, and there are no outcoming edges from them.

2. Every vertex has precisely two outgoing edges, except the two terminal ones (both edges can lead to the same vertex).

3. There is a path to at least one of the terminal vertices from each vertex in the graph.

In the beginning, Batyr chooses the starting vertex, different from the terminal vertices, in the directed gaming graph and puts there a ball. Then Batyr starts hitting the ball until it lands in one of the terminal vertices. Since Batyr does not play well, he hits the ball so that it goes through one of the two outgoing edges with equal probability and lands in the vertex this edge leads to.

Construct a directed gaming graph consisting of no more than n vertices, and select a starting vertex in it such that the probability of landing in the terminal vertices is equal to $\frac{a}{a+b}$ for the first terminal vertex and $\frac{b}{a+b}$ for the second.

Input

Each test contains multiple test cases.

The first line contains two integers t and n $(1 \leq t \leq 100, 33 \leq n \leq 100)$ — the number of test cases and the maximum number of vertices for each set.

The first and only line of each test case contains two integers a and b $(1 \leq a, b \leq 10^9)$.

Output

For each test case, print the graph in the following format.

In the first line two integers m, s $(3 \leq m \leq n, 3 \leq s \leq m)$ - the number of vertices and starting vertex in the graph.

In the each following $m - 2$ lines print two integers v_i, u_i $(3 \leq i \leq m, 1 \leq v_i, u_i \leq m)$ - end vertices outgoing from the vertex i.

The probability of landing in the vertex 1 starting from vertex s should be $\frac{a}{a+b}$.

The probability of landing in the vertex 2 starting from vertex s should be $\frac{b}{a+b}$.

There should be a path from each vertex to at least one of the terminal vertices.

Scoring

This task contains 10 subtasks.

Subtask	n	**Additional restrictions**	**Points**	**Required subtasks**
0	—	Examples	0	—
1	100	$a+b=4$	10	—
2	100	$a+b=32$	10	—
3	50	$a+b=2^{30}$	10	—
4	33	$a,b \leq 15$	10	—
5	64	—	10	—
6	50	—	10	5
7	36	—	10	6
8	35	—	10	7
9	34	—	10	8
10	33	—	10	1, 2, 3, 4, 9

Example

standard input	standard output
4 100 1 1 1 2 1 3 2 3	3 3 1 2 4 3 2 4 1 3 4 3 4 2 1 2 5 3 4 5 1 5 2 3