

1 Score Maximum Points

In an arcade game of bubbles, a pattern of bubbles that form a binary tree is displayed. Each bubble (or node) is assigned of a value i.e., a random integer number. A node (or bubble) can have at most two children. A missing child is always represented as -1. A player can burst the bubbles and gain the points.

Rule of scoring:

A player cannot choose to burst any two bubbles that are directly linked to each other.

Given the number of bubbles of the binary tree and their values (random numbers), write a program to find out the maximum points a player can score without bursting any two bubbles that are directly linked to each other in the tree.

Input/Output

Input	Output	Comments
7 3 2 3 -1 3 -1 1	1	<ul style="list-style-type: none"> First line 7 indicates the number of nodes (bubbles). Second line 3 2 3 -1 3 -1 1 represents the binary tree. <div style="text-align: center;"> <pre> 3 /\ 2 3 /\ \ 3 1 </pre> </div> The maximum points the player can score is: 3 (root) + 3 (leaf) + 1 (leaf) = 7 Root (3) is selected, so its children (2 & 3) cannot be selected as it breaks the rule of scoring and the game ends.
7 3 4 5 1 3 -1 1	9	

2 Balloons for Decoration

Steve, a balloon decorator, has a big storage box $N \times M$ compartments. N number of rows, M is the number of columns. His assistants have picked balloons of different colors and placed one balloon in each compartment in random order. Each color is numbered as an integer.

Steve is in rush to finish decoration for a birthday party. He wants to select balloons of single color or two different colors. Now, Steve doesn't want to waste his time in selecting the balloons. So, he decided to select the balloons from one connected area. A connected area is a set of compartments such that we can move from any compartment to any other compartment in this set by only moving between side-adjacent compartments from the set.

Given the size of the box i.e., rows and columns, and the color codes of balloons, write a program to find the number of balloons that form maximum connected area.

Input/Output

Input	Output	Comments
4 5 1 1 2 3 1 3 1 2 5 2 5 2 1 5 6 1 3 1 2 1	10	<ul style="list-style-type: none"> • First line 4 5 represents number of rows and columns. • The next four lines represent the color codes of balloons in each compartment. • The balloons with color codes (1 and 2) form the largest connected area of size 10.

3 Pillars of Blocks

There are wooden square building blocks of different heights but same width. The height of the block is indicated on each of them. Three pillars of different heights were built by stacking those blocks on each other.

Peter is challenged to set the pillars with equal heights by removing any number of top most blocks from each of them such that all the three pillars shall have the maximum equal height possible. He is also told there could a pillar without a block. That's strange!!!

Given the number of blocks in each pillar and their corresponding heights, write a program for Peter to find out the maximum equal height all the pillars can be set to.

Input	Output	Comments
5 3 4 3 2 1 1 1 4 3 2 1 1 4 1	5	<ul style="list-style-type: none"> First line 5 3 4 represents total number of blocks in the first, second and third pillars. Second line represents the blocks and their heights of the first pillar Third line represents the blocks and their heights of the second pillar Fourth line represents the blocks and their heights of the third pillar Initially, the stacks look like this: <pre> 3 2 1 1 4 1 1 3 4 1 2 1 </pre> Remove block-3 from pillar-1, block-4 from pillar-2 and blocks (1 and 1) from pillar-3 then all three pillars shall have equal maximum height of 5