Binary Sum

Problem Code: **LFSM**

In a binary tree, diameter sum between two leaf nodes is defined as sum of all the nodes in the unique path when traveling from one leaf to the other. Assume that the tree is a complete binary tree and every leaf node is at the same depth from root of the tree. Find the value of maximum diameter sum in a binary tree.

Note that the maximum diameter may be a single leaf node as well (since a single leaf node is also a valid diameter - the trivial path of length 0 from the leaf node to itself).

Input

First line of input is the number T, which denotes the number of test cases.

Input for each case consists of 2 lines. The first line consists of the number of nodes N in the tree. The following line consists of the numbers A[1..n] which denote the value of each node in the tree.

The first element in the input is the root element of the tree. Considering index of root element is 1 in the following problem, left child of i'th element in the input is the (2*i)th element and right child of ith element is (2*i+1)th element.

Output

Output consits of T lines denoting the value of maximum diameter sum in binary tree for each test case.

Solution Templates

In the solution templates provided, complete the function whose signature is

```
C / C++
int maxDiameterSum(int nodes, int tree[511])

Java
static int maxDiameterSum(int nodes, int[] tree)
```

The first argument to maxDiameterSum is the number of nodes in the tree. The second argument is tree, presented in an array format as described in the Input Section above. maxDiameterSum should return the value of the maximum diameter sum in the binary tree.

Note: You are allowed to edit the code as you please. Add / delete headers. Add / delete methods. And so on.. So long as your final code solves the problem with Input and Output as described above. You may submit your own code, without using the template at all.

Constraints

```
T ≤ 100
N ≤ 511
Range of value of nodes is between -100000 and 100000
N is of the form 2^k-1, where k is the height of the tree.
```

Sample Input

All Submissions (/DI16R144/status/LFSM)

Successful Submissions +

```
1
7
2 4 5 8 -4 3 -6
```

Sample Output

```
22
```

Explanation

Path followed to get the maximum diameter sum in this case is

```
8 (leaf node) => 4 => 2 => 5 => 3 (leaf node)
```

Author:	directi_campus (/users/directi_campus)
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Source Limit:	50000 Bytes
Languages:	C, CPP 4.3.2, CPP 6.3, CPP14, JAVA, PYTH, PYTH 3.5

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