Find The Peak

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| Program: peak.(py|cpp|java)  Input: peak.in  Output: peak.out |

**Description**

Given an array of integers *A*, your task is to find an index *i* such that and . We call such index *i* a peak index. Design an algorithm to find any peak index in *A* where the running time isat most *O(log n)*.   
Note may assume and where *n* is the length of *A*.

Input

The first line on the input file contains an integer denoting the number of test cases. Each test case is represented on a separate line as follows

where is the arrays size and *A[i] = .*

Output

For each test case, print on a separate line the index of the peak.

Additional Deliverables

1. Time and space analysis for the algorithm part only. Proof your result by induction if necessary.
2. Is your algorithm brute-force, backtracking, or a divide-and-conquer? Explain your answer.

**Sample Input /output**

3

3 1 2 3

10 1 2 3 4 6 7 8 9 0 10

4 3 21 5 9 2

peak.out

2

7

3

peak.in