Jahil's Pair Pursuit: The Sum Enigma

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In the vibrant realm of **Numeria**, the wise and ever-resourceful **Priet** was celebrated for his keen intellect and knack for solving even the trickiest puzzles. One day, the kingdom's revered Mathematician unveiled a challenge designed to test the mettle of Numeria's finest minds. The task was simple in description yet devilishly deceptive in execution.

The challenge was this: **Given an array of integers and a target sum T, find the number of unique pairs (i, j) (with i < j) such that the sum of the two elements equals T.**

Meanwhile, his less fortunate companion, **Jahil**, known across Numeria for his comically muddled reasoning, began counting every conceivable pair, often mixing up the order and overcounting the results.

As they set out on their quest, Priet calmly explained to Jahil:

> "Remember, my friend, only count pairs where the first number appears before the second. This is the key to unlocking the true treasure hidden within these numbers."

Amidst Jahil's humorous misadventures and Priet's meticulous strategy, the duo traversed the maze of numbers, seeking the elusive pairs whose sum equaled **T**. Their journey through arrays and arithmetic soon became the talk of the kingdom. Citizens wondered: could you, too, solve the riddle and count the pairs correctly?

The Challenge

You are given an array of **n** integers and an integer target **T**. Determine the number of pairs **(i, j)** (with **0 ≤ i < j < n**) such that:

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A[i] + A[j] = T
```

Input Format

- The first line contains an integer t, the number of test cases.
- Each test case consists of:
  - A line with two space-separated integers: n (the number of elements in the array) and T (the target sum).
  - A line with n space-separated integers representing the array A.

Output Format

For each test case, output a single integer on a new line—the number of valid pairs whose sum equals T.

Constraints

- You are expected to use **Binary Search Trees** for this question. Not using BST may impose a penalty.
- You need not worry about n^2 creation of BST, as skewed tree wont be given.
- $1 \le t \le 10^5$
- $1 \le n \le 2 \times 10^6$ (for each test case)
- The sum of n over all test cases does not exceed 2×10^6
- $0 \le A[i] \le 10^{12}$
- $0 \le T \le 2 \times 10^{12}$

Sample Input

```
3
5 9
1 2 3 4 5
4 0
0 0 0 0
1 100
100
```

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Sample Output

```
1
6
0
```

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Explanation

- **Input:** n = 5, T = 9, Array: [1, 2, 3, 4, 5]
- **Valid Pair:** Only the pair (4, 5) (i.e. indices 3 and 4) has a sum of 9.
- **Output:** 1

2. **Test Case 2:**

- **Input:** n = 4, T = 0, Array: [0, 0, 0, 0]
- **Valid Pairs:** Every pair of zeros sums to 0. There are (4 choose 2) = 6 such pairs.
- **Output:** 6

3. **Test Case 3:**

- **Input:** n = 1, T = 100, Array: [100]
- **Explanation:** With only one element, no pair can be formed.
- **Output:** 0

❓ Clarifications

Request clarification

No clarifications have been made at this time.