**Algorithmic Problem Solving 2021**

**Q-Box Assignment Set**

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**Question 02**

Title: It’s Shopping Time

Level: Medium

Concepts Tested:  Dynamic Programming (Subset sum), Simple Math

**Problem Statement:**

Apoorva and her friend Jojo went for buying some groceries. That day there was a Megasale in the store. There were N items in the store labeled from 1 to N and the price of each item was given as P1,P2,...PN.

The people coming into the store were asked to pick a magical number K from a box at the counter of the store.

While shopping Apoorva purchases X items from N items and Jojo purchases Y items from remaining items.

The manager announces amidst shopping that the items purchased would be charged free if the amount in the bill is equal to magical number.

As Jojo is a good friend of Apoorva, he says that he will pay her bill too.

Your task is to find the number of ways W by which (X+Y) items can be purchased to get all items for free.

**Input Format:**

The first line of the input contains T number of test cases

The second line contains two integers N, K

The third line contains the N integers P1,P2......PN

**Constraints:**

1<=T<=104

1<=N, K<=103

1<=Pi<=106

0<=X,Y<=N

**Output Format:**

For each test case, print a single integer W representing the number of ways they can purchase items to get the items for free

**Solution:**

**#include<bits/stdc++.h>**

**using namespace std;**

**#define ll long long**

**ll findAllWays(ll \*arr, ll n, ll k);**

**int main()**

**{**

**ll t;**

**ll n,k;**

**cin>>t;**

**while(t--){**

**cin>>n>>k;//Taking number of items and magical number as input**

**ll arr[n+1];//price array**

**for(int i=0;i<n;i++)**

**{**

**cin>>arr[i];**

**}**

**ll ways= findAllWays(arr,n,k);**

**cout<<ways<<"\n";**

**}**

**return 0;**

**}**

**ll findAllWays(ll \*arr, ll n, ll k)**

**{**

**ll sum,val;**

**val=k;**

**ll price[n+1][val+1];**

**for(ll i=1;i<=val;i++){**

**price[0][i]=0;**

**}**

**for(ll i=0;i<=n;i++){**

**price[i][0]=1;**

**}**

**for(ll i=1;i<=n;i++){**

**for(ll j=1;j<=val;j++){**

**if(arr[i-1]<=j){**

**price[i][j]=price[i-1][j]+price[i-1][j-arr[i-1]];**

**}**

**else{**

**price[i][j]=price[i-1][j];**

**}**

**}**

**}**

**return price[n][val];**

**}**

**Sample Test Cases:**

Input:

2

4 5

4 2 1 3

5 13

3 4 3 8 8

Output:

2

0

**Explanation:**

Sample test case 1: The magical number is 5. The combinations possible are -

They can purchase item 1 and item 3 as 4+1=5.

They can purchase item 2 and item 4 as 2+3=5

Hence total number of ways in which they can purchase the items is 2.

Sample test case 2: The magical number=13.

There is no such way in which the items can be purchased such that the bill amount equals 13.

Hence output is 0.

**Test Cases:**

Input & Output files attached.