A. Alpenliebe

1 second, 256 megabytes

It's your birthday and you want to distribute Alpenleibe to your friends in an interesting way. You have N friends F_1, F_2 ... F_N. Suppose you give M_i Alpenleibe to your i^{th} friend, F_i. You don't like your first (F_1), second (F_2), third (F_3), and fourth friend (F_4), so you give 0 Alpenleibe to them, but you give 1 Alpenliebe to your fifth friend (F_5).

For others, to the F_i friend, if i is **odd** you give $i + M_{i-1} + M_{i-3} + M_{i-5}$ Alpenliebe else you give $i/2 + M_{i-2} + M_{i-4}$ Alpenleibe where [x/y] represents integer division, i.e., the quotient when you divide x by y.

Given N, find the number of Alpenleibe you give to F_N.

Input
You are given one integer N.

$1 \leq N \leq 20$

Output
Print M_N, the number of Alpenleibe you give to your N^{th} friend.

input
1
output
0

input
5
output
1

B. Pick Some Get Some

3 seconds, 256 megabytes

Given an array A of n integers and an integer x. Find if there exists a subsequence $B = b_1 b_2 \ldots b_k$ of the array A of length $k (k \geq 1)$ such that, after multilying some (possible none) elements of B by -1, the sum of the elements of B becomes x.

Note: A subsequence is a sequence which can be obtained by removing some (possibly none) elements from the original sequence. For example, [3, 3] is a subsequence of [4, 3, 1, 3] but [1, 4] is not.

Input
First line of input contains 3 integers n, k, x ($1 \leq k \leq n \leq 20$) and ($-10^{15} \leq x \leq 10^{15}$).

Second line contains n integers a_1, a_2 .... a_n ($-10^9 \leq a_i \leq 10^9$).

Output
Print "Yes" (without quotes) if such a subsequence exists in the array, else print "No".

input
5 3 7 5 1 4 3 1
output
Yes

input
5 3 7 7 3 4 5 2
output
Yes

input
5 3 7 7 3 4 5 12
output
No

In the first test case, $5 + 1 + 1 = 7$

In the second test case, $4 + 5 - 2 = 7$

In the third test case, there is no such subsequence of length 3.

C. Subsequence check

1 second, 256 megabytes

Your friend challenged you to a problem (**t times**).

There are n elements in an array. You have to find whether there exists a subsequence of the array whose **sum is a multiple of k**. But there is a catch. Your friend decided to **remove 1 element** from the array (any element). Now, you need to find whether you can get a subsequence whose **sum is a multiple of k** no matter which element was deleted by your friend (**subsequence must contain atleast 1 element**).

A string A is a subsequence of a string B if A can be obtained from B by deletion of several (possibly, zero or all) characters.

Input
The first line contains one integer t ($1 \leq t \leq 5$) — the number of test cases. Each test case consists of two lines.

The first line contains two integers n ($1 \leq n \leq 18$) — the length of the array and k ($1 \leq k \leq 10^9$).

The second line contains n integers a_1,a_2,a_3.....a_n ($-10^9 \leq a_i \leq 10^9$).

It is guaranteed that the sum of n over all test cases does not exceed 18.

Output
Print "YES" if you can find such a subsequence, "NO" otherwise.

input
1 5 1 1 2 3 4 5
output
YES

input
1 4 4 1 2 -2 -1
output
YES

input
1 4 4 0 0 0 0
output
YES

input
1 3 3 5 11 7
output
NO

Explanation of test case :

k = 4

arr = 1 2 -2 -1

If we delete 1: Subsequence: 2 + (-2) = 0

If we delete 2: Subsequence: 1 + (-1) = 0

If we delete -2: Subsequence: 1 + (-1) = 0

If we delete 1: Subsequence: 2 + (-2) = 0

We are getting a subsequence divisible by k, no matter which element is deleted, therefore the answer is YES

NOTE: Remainder of 0 with any number is always 0.

NOTE: Remainder of -xk with k is always 0 (Here x is any positive integer), e.g., -4 is divisble by 2.