ShaKer 2018 Coding Battle

C. « Sea Storm »

Problème

A storm hit you at sea, and a water deluge threatens your ship ! The water makes the deck so slippery that all your crew risks falling overboard from the ship. . . and end up in the stomach of the Kraken !

By chance, the hats your pirates are so proud of can also be used as umbrellas. Everyone at their battle station ! Your pirates shall all take a position along the deck, their hats on their heads, to keep the floor dry.

A deck too slippery to walk safely

The deck can be considered as a graduated line segment with L marks, identified by integers from 1 to L. Each of these L locations must be covered. Your pirates can only be located at some of these positions, corresponding to battle stations, and they all have a hat, but their hats can have a different size. There are as many pirates as battle stations.

Your mission is to find out wether it is possible to cover the deck with the hats, by placing one pirate at each battle station.

Input

— On the first line, two space-separated integers $10 \leq L \leq 1000$ and $1 \leq N \leq 40$: the length of the deck, and the number of pirates ;
— On the second line, N space-separated integers $1 \leq P_i \leq L$, each giving the position of one battle station on the deck. These positions are distinct and given in increasing order ;
— On the third line, N space-separated integers $1 \leq H_i \leq 20$, each giving the size of one pirate's hat. H_i is actually the radius of the hat, i.e the number of marks on the right and on the left that it can cover. Of course, a hat covers the mark where the pirate is located. The hats are given in a random order.

Note : the hat of a pirate can cover the hat of another one.

Output

— `YES` if it is possible to place the pirates at the battle stations so that all the deck is covered ;
— `NO` if it is impossible.

Important : To score points, you don't need a very efficient solution (a brute force can be accepted for the "basic" and "advanced" test sets). For the "performance" test set, you need to find a few optimizations.

Examples

Example 1 - The deck stays dry

Input
10 3 1 3 10 4 1 2

Output
YES

Example 2 - The Kraken is fed

Input
15 2 4 9 3 5

Output
NO

Example 3 - The deck is covered

Input
20 4 3 7 8 15 2 2 9 2

Output
YES