Submissions

Fairland

3pt Not attempted **319/328 users** correct (97%)

9pt Not attempted **212/291 users** correct (73%)

Smoothing Window

6pt Not attempted **194/268 users** correct (72%)

7pt Not attempted **184/194 users** correct (95%)

Runaway Quail

8pt Not attempted **45/107 users** correct (42%)

15pt Not attempted **16/20 users** correct (80%)

Log Set

6pt Not attempted **197/212 users** correct (93%)

19pt Not attempted **55/109 users** correct (50%)

River Flow

10pt Not attempted **15/43 users** correct (35%)

17pt Not attempted **11/11 users** correct (100%)

Top Scores

rng..58	73
tkociumaka	73
Gennady.Korotkevich	73
Xhark	73
linguo	72
iwi	68
tczajka	64
simonlindholm	60
kevinsogo	60
vepifanov	58

Problem D. Log Set

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 6 points	Solve D-small
Large input 19 points	Solve D-large

Problem

The *power set* of a set S is the set of all subsets of S (including the empty set and S itself). It's easy to go from a set to a power set, but in this problem, we'll go in the other direction!

We've started with a set of (not necessarily unique) integers S, found its power set, and then replaced every element in the power set with the sum of elements of that element, forming a new set S'. For example, if S = {-1, 1}, then the power set of S is {{}, {-1}, {1}, {-1, 1}}, and so S' = {0, -1, 1, 0}. S' is allowed to contain duplicates, so if S has N elements, then S' always has exactly 2^N elements.

Given a description of the elements in S' and their frequencies, can you determine our original S? It is guaranteed that S exists. If there are multiple possible sets S that could have produced S', we guarantee that our original set S was the *earliest* one of those possibilities. To determine whether a set S_1 is earlier than a different set S_2 of the same length, sort each set into nondecreasing order and then examine the leftmost position at which the sets differ. S_1 is earlier iff the element at that position in S_1 is smaller than the element at that position in S_2.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each consists of one line with an integer **P**, followed by two more lines, each of which has **P** space-separated integers. The first of those lines will have all of the different elements E_1, E_2, ..., $E_\mathbf{P}$ that appear in S', sorted in ascending order. The second of those lines will have the number of times F_1, F_2, ..., $F_\mathbf{P}$ that each of those values appears in S'. That is, for any i, the element E_i appears F_i times in S'.

Output

For each test case, output one line containing "Case #x: ", where x is the test case number (starting from 1), followed by the elements of our original set S, separated by spaces, in nondecreasing order. (You will be listing the elements of S directly, and not providing two lists of elements and frequencies as we do for S'.)

Limits

$1 \le \mathbf{T} \le 100$.
$1 \le \mathbf{P} \le 10000$.
$\mathbf{F_i} \ge 1$.

Small dataset

S will contain between 1 and 20 elements.
$0 \le$ each $E_i \le 10^8$.

Large dataset

S will contain between 1 and 60 elements.
$-10^{10} \le$ each $E_i \le 10^{10}$.

Sample

Input	Output
5 8 0 1 2 3 4 5 6 7 1 1 1 1 1 1 1 1 4 0 1 2 3 1 3 3 1 4	Case #1: 1 2 4 Case #2: 1 1 1 Case #3: 0 0 1 3 Case #4: -1 1 Case #5: -2 1 1

```
0 1 3 4
4 4 4 4
3
-1 0 1
1 2 1
5
-2 -1 0 1 2
1 2 2 2 1
```

Note that Cases #4 and #5 are not within the limits for the Small dataset.

In Case #4, S = {-1, 1} is the only possible set that satisfies the conditions. (Its subsets are {}, {-1}, {1}, and {-1, 1}. Those have sums 0, -1, 1, and 0, respectively, so S' has one copy of -1, two copies of 0, and one copy of 1, which matches the specifications in the input.)

For Case #5, note that S = {-1, -1, 2} also produces the same S' = {-2, -1, -1, 0, 0, 1, 1, 2}, but S = {-2, 1, 1} is earlier than {-1, -1, 2}, since at the first point of difference, -2 < -1. So `-1 -1 2` would **not** be an acceptable answer. `1 -2 1` would also be unacceptable, even though it is the correct set, because the elements are not listed in nondecreasing order.