Islamic University of Technology

Department of Computer Science and Engineering

Lab 9: Greedy Algorithms

CSE 4404: Algorithms Lab
Summer 2023-24

Task A. Fruit Ninja Frenzy

Time Limit: 2 seconds | Memory Limit: 512 MB

The screen is overflowing with fruits, each ready to fall if you don't slice them in time.

Each fruit i has a **fall time** f_i and a **point value** p_i you earn if you slice it before it falls.

You can slice at most one fruit per unit of time, and must slice a fruit at some integer time $t \leq f_i$.

Your mission? Slice fruits smartly to maximize your total points and become the ultimate Fruit Ninja Champion!

Input Format

The first line contains an integer T $(1 \leq T \leq 10)$ — the number of test cases.

Each test case consists of:

- A line with an integer n $(1 \leq n \leq 10^5)$ — the number of fruits.

- A line with n integers $f_1, f_2, \ldots, f_n$ $(1 \leq f_i \leq 10^9)$ — the fall times of the fruits.

- A line with n integers $p_1, p_2, \ldots, p_n$ $(1 \leq p_i \leq 10^9)$ — the points for each fruit.

It is guaranteed that the sum of n over all test cases does not exceed 2×10^5.

Output Format

For each test case, print a single integer — the maximum total points you can earn.

Examples

Sample Input	Sample Output
4	140
5	100
2 2 3 3 4	100
10 20 30 40 50	17
3	
1 1 1	
100 10 1	
4	
5 5 5 5	
10 20 30 40	
6	
1 2 2 3 4 4	
5 4 3 2 1 6	

Task B. Whisper of the Heart

Time Limit: 2 seconds | Memory Limit: 512 MB

Shizuku and Seiji have a pile of n books that must be read. Each book requires some time to finish, and both of them must read every single book from start to end.

However, they cannot read the same book simultaneously; one must finish a book before the other starts it.

Your task is to find the minimum total time needed for both of them to finish reading all the books.

Input Format

The first line contains an integer n $(1 \leq n \leq 2 \times 10^5)$ — the number of books.

The second line contains n integers $t_1, t_2, \ldots, t_n$ $(1 \leq t_i \leq 10^9)$ — the time required to read each book.

Output Format

Print one integer — the minimum total time required for Shizuku and Seiji to finish reading all the books.

Examples

Sample Input	Sample Output
3 2 8 3	16
10 1 1 1 1 1 1 1 1 1 1	10

Marks Distribution

Task	Marks
Task A	50%
Task B	50%

Practice Problems

Problem	Links
Movie Festival	CSES: cses.fi/task/1629
	Vjudge: vjudge.net/problem/CSES-1629
Tasks and Deadlines	CSES: cses.fi/task/1630
	Vjudge: vjudge.net/problem/CSES-1630
Stick Lengths	CSES: cses.fi/task/1074
	Vjudge: vjudge.net/problem/CSES-1074
Two Sets	CSES: cses.fi/task/1092
	Vjudge: vjudge.net/problem/CSES-1092
Ferris Wheel	CSES: cses.fi/task/1090
	Vjudge: vjudge.net/problem/CSES-1090
Grouping Increases	Codeforces: codeforces.com/1919C
	Vjudge: vjudge.net/problem/CodeForces-1919C
Eid Salami	Vjudge: vjudge.net/problem/Gym-612054E