Problem 9: Factory Assembly Line Optimization

Time limit: 3 seconds

In the bustling city of Optimizia, factories operate interconnected assembly lines where each workstation processes parts. Transferring parts between two workstations consumes energy, and the factory's management wants to minimize the total energy consumption required to produce high-tech gadgets.

The factory has N workstations, numbered from 1 to N. Each workstation has specific input requirements and output production:

1. Workstation i requires $p[i-1]$ parts as input.

2. Workstation i produces $p[i]$ parts as output.

Energy consumption depends on the transfer between groups of workstations. Specifically:

- If workstation ii processes a batch of x parts and passes it to a group ending at workstation j, the **energy consumed** for this transfer is proportional to:

$$Energy = p[i-1] \times p[i] \times p[j]$$

where:

- $p[i-1]$: Input parts to workstation i,

- $p[i]$: Output parts from workstation i,

- $p[j]$: Input parts required by workstation j.

Your task is to determine the minimum total energy consumption needed to transfer all parts across N workstations by optimizing the grouping and processing sequence.

Input

The first line contains the number of test cases, and each test case consists of:

1. An integer N $(2 \leq N \leq 100)$, representing the number of workstations in the factory.

2. An array of $N+1$ integers $p[0], p[1], ..., p[N]$, where $(1 \leq p[i] \leq 1000)$:

   o $p[i-1]$ is the number of parts required at the input of workstation i,

   o $p[i]$ is the number of parts produced at the output of workstation i.

Output

For each test case, output a single integer: representing the minimum total energy required to transfer all parts across the workstations.

Sample input & output

The following is an example of a sample input and corresponding correct outputs.

Sample input	Sample Output
2	38000
4	330
10 20 30 40 50	
3	
5 10 3 12	