Matrix Chain Multiplication

Problem: Given a list of dimensions of matrices to be multiplied, from left to right, determine the minimum number of multiplications necessary to calculate the matrix product.

Input

The first line of input contains a single positive integer, ***c,*** the number of input cases. The input cases follow. The first line of each input case contains a single positive integer, ***n,*** representing the number of matrices in the product. The following ***n*** lines contain two integers each, the number of rows and columns, respectively of the corresponding matrix. It is guaranteed that a valid product exists; namely, the number of columns in any matrix but the last will equal the number of rows in the subsequent matrix.

Output

For each input case, on a line by itself, output the minimum number of multiplications necessary to calculate the matrix product.

Sample Input

```
2
3
3 5
5 1
1 2
4
2 3
3 1
1 7
7 1
```

Sample Output

```
21
15
```