Problem B – Because, Art!

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Leo is a designer. He has a collection of N fonts and N colors, each of them having an integer grade that indicates how much beautiful it is. A negative grade indicates that the font or color is "ugly".

Based on that, Leo invented a new way of measuring the beauty of any text. If a text has a font of grade F_i and a color of grade C_j, then the beauty of the text is the product $F_i \times C_j$. Note that when both the font and the color are ugly, the resulting text is beautiful, because, Art!

Leo has to present to his boss k beautiful text designs. The boss said to him that the texts must be really different from each other. With this in mind, Leo decided to select a distinct font and a distinct color for each text in such a way that the sum of the beauties of the k formed texts is maximum. For his pride, he also wants to know the minimum possible sum of the beauties of k texts made of distinct fonts and colors.

But there is a problem! Leo forgot how many designs the boss asked for, so he needs to find the answer for each integer k between 1 and N.

Input

The first line contains an integer N ($1 \leq N \leq 10^5$) indicating the number of fonts and colors. The second line contains N integers $F_1, F_2, \ldots, F_N$ ($-10^4 \leq F_i \leq 10^4$ for $i = 1, 2, \ldots, N$), representing the grades of the fonts. The third line contains N integers $C_1, C_2, \ldots, C_N$ ($-10^4 \leq C_i \leq 10^4$ for $i = 1, 2, \ldots, N$), denoting the grades of the colors.

Output

Output N lines, such that the k-th line contains two integers indicating respectively the minimum and maximum sum of beauties if the boss asks for k texts.

Sample input 1	**Sample output 1**
2 -100 -10 1 2	-200 -10 -210 -120

Sample input 2	**Sample output 2**
4 0 -1 1 2 10 20 30 40	-40 80 -40 110 -30 110 0 100