Objective

In this challenge, we practice calculating the interquartile range. We recommend you complete the Quartiles challenge before attempting this problem.

Task

The interquartile range of an array is the difference between its first (Q_1) and third (Q_3) quartiles (i.e., $Q_3 - Q_1$).

Given an array, X, of n integers and an array, F, representing the respective frequencies of X's elements, construct a data set, S, where each x_i occurs at frequency f_i. Then calculate and print S's interquartile range, rounded to a scale of 1 decimal place (i.e., 12.3 format).

Tip: Be careful to not use integer division when averaging the middle two elements for a data set with an even number of elements, and be sure to not include the median in your upper and lower data sets.

Input Format

The first line contains an integer, n, denoting the number of elements in arrays X and F.
The second line contains n space-separated integers describing the respective elements of array X.
The third line contains n space-separated integers describing the respective elements of array F.

Constraints

- $5 \leq n \leq 50$
- $0 < x_i \leq 100$, where x_i is the ith element of array X.
- $0 < \sum_{i=0}^{n-1} f_i \leq 10^3$, where f_i is the ith element of array F.
- The number of elements in S is equal to $\sum F$.

Output Format

Print the interquartile range for the expanded data set on a new line. Round your answer to a scale of 1 decimal place (i.e., 12.3 format).

Sample Input

```
6
6 12 8 10 20 16
5 4 3 2 1 5
```

Sample Output

```
9.0
```

Explanation

The given data is:

Element	Frequency
6	5
12	4
8	3
10	2
20	1
16	5

First, we create data set S containing the data from set X at the respective frequencies specified by F:

$$S = \{6, 6, 6, 6, 6, 8, 8, 8, 10, 10, 12, 12, 12, 12, 16, 16, 16, 16, 16, 20\}$$

As there are an even number of data points in the original ordered data set, we will split this data set exactly in half:

> Lower half (L): 6, 6, 6, 6, 6, 8, 8, 8, 10, 10
>
> Upper half (U): 12, 12, 12, 12, 16, 16, 16, 16, 16, 20

Next, we find Q_1. There are 10 elements in *lower* half, so $Q1$ is the average of the middle two elements: 6 and 8. Thus, $Q_1 = \frac{6+8}{2} = 7.0$.

Next, we find Q_3. There are 10 elements in *upper* half, so $Q3$ is the average of the middle two elements: 16 and 16. Thus, $Q_3 = \frac{16+16}{2} = 16.0$.

From this, we calculate the interquartile range as $Q_3 - Q_1 = 16.0 - 7.0 = 9.0$ and print 9.0 as our answer.