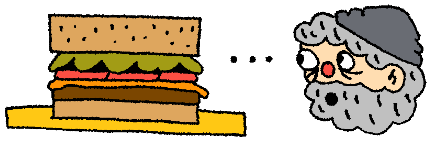
Euclid in Manhattan

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	512 mebibytes



Due to an unfortunate time-travel accident, Euclid finds himself wandering the streets of modern-day Manhattan. To his dismay, he discovers that people are measuring distances using the so-called *Manhattan metric*!

"This isn't the shortest path at all, and I can prove that!", he shouted. Passers-by didn't care about the crazy man.

Manhattan is structured as a grid formed by the Cartesian product of two axes, A and B. The positive direction along axis A goes **right**, and along axis B goes **down**.

Each axis is partitioned into segments that alternate between:

- Residential zones: these are solid blocks that cannot be traversed,
- Streets (or avenues): gaps between the residential zones, where movement is allowed.

The segments are numbered starting from 1, and the pattern alternates: segments with odd indices are residential, and even indices are gaps. The number of segments is always odd.

Additionally, no street or avenue is wider than any dimension of any residential zone. Formally, among the segments on both axes, the smallest segment with an odd index is no less than the largest segment with an even index.

We define a point (x, y) to be *inside a building* if it lies within a horizontal residential segment (from axis A) **and** within a vertical residential segment (from axis B). These building areas are impassable. You may move freely elsewhere, as long as your path does not pass through the interior of any building. Touching the edges or corners is allowed.

Euclid wants to get from the top-left corner of the grid to the bottom-right corner, moving through open areas only, and using Euclidean distance. Help him find the shortest possible path!

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 100$). The description of the test cases follows.

Each test case is described as follows:

- A line containing two integers n and m ($1 \le n, m \le 2000$): the number of residential segments along the horizontal and vertical axes, respectively.
- A line with n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^6$): the widths of the horizontal residential segments.
- A line with $n-1$ integers $b_1, b_2, \ldots, b_{n-1}$ ($1 \le b_i \le 10^6$): the widths of the horizontal gaps (streets) between residential blocks. For input consistency, we add an extra zero at the end of this line. It should be read and ignored.
- A line with m integers $c_1, c_2, \ldots, c_m$ ($1 \le c_i \le 10^6$): the heights of the vertical residential segments.
- A line with $m-1$ integers $d_1, d_2, \ldots, d_{m-1}$ ($1 \le d_i \le 10^6$): the heights of the vertical gaps (avenues) between residential blocks. For input consistency, we add an extra zero at the end of this line. It should be read and ignored.

In each test case, $\max(b_1, \ldots, b_{n-1}, d_1, \ldots, d_{m-1}) \le \min(a_1, \ldots, a_n, c_1, \ldots, c_m)$.

The sum of $n \cdot m$ over all test cases does not exceed $4 \cdot 10^6$.

Output

For each test case print a single real number: the minimum Euclidean distance needed to travel from the top-left corner to the bottom-right corner, without passing through the interior of any building.

Your answer must have an absolute or relative error of at most 10^{-9}.

Example

standard input	*standard output*
2 1 1 1 0 3 0 2 2 3 3 2 0 4 4 3 0	4.0000000000 15.7147766421

Note

You can see the illustrations for the two example test cases below.