Kick Start 2015 - Round A

gCube

Problem

Googlers are very interested in cubes, but they are bored with normal three-dimensional cubes and also want to think about other kinds of cubes! A "D-dimensional cube" has D dimensions, all of equal length. (D may be any positive integer; for example, a 1-dimensional cube is a line segment, and a 2-dimensional cube is a square, and a 4-dimensional cube is a hypercube.) A "D-dimensional cuboid" has D dimensions, but they might not all have the same lengths.

Suppose we have an **N**-dimensional cuboid. The **N** dimensions are numbered in order (0, 1, 2, ..., N - 1), and each dimension has a certain length. We want to solve many subproblems of this type:

1. Take all consecutive dimensions between the $\mathbf{L_i}$-th dimension and $\mathbf{R_i}$-th dimension, inclusive.

2. Use those dimensions to form a D-dimensional cuboid, where D = $\mathbf{R_i}$ - $\mathbf{L_i}$ + 1. (For example, if $\mathbf{L_i}$ = 3 and $\mathbf{R_i}$ = 6, we would form a 4-dimensional cuboid using the 3rd, 4th, 5th, and 6th dimensions of our **N**-dimensional cuboid.)

3. Reshape it into a D-dimensional cube **that has exactly the same volume as that D-dimensional cuboid**, and find the edge length of that cube.

Each test case will have **M** subproblems like this, all of which use the same original **N**-dimensional cuboid.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow.

Each test case begins with two integers **N** and **M**; **N** is the number of dimensions and **M** is the number of queries. Then there is one line with **N** positive integers $\mathbf{a_i}$, which are the lengths of the dimensions, in order. Then, **M** lines follow. In the ith line, there are two integers $\mathbf{L_i}$ and $\mathbf{R_i}$, which give the range of dimensions to use for the ith subproblem.

Output

For each test case, output one line containing "Case #x:", where x is the test case number (starting from 1). After that, output **M** lines, where the ith line has the edge length for the ith subproblem. An edge length will be considered correct if it is within an absolute error of 10^{-6} of the correct answer. See the FAQ for an explanation of what that means, and what formats of real numbers we accept.

Limits

Time limit: 30 seconds per test set.
Memory limit: 1GB.
$1 \le \mathbf{T} \le 100$.
$1 \le \mathbf{a_i} \le 10^9$.
$0 \le \mathbf{L_i} \le \mathbf{R_i} < \mathbf{N}$.

Small dataset (Test Set 1 - Visible)

1 ≤ **N** ≤ 10.
1 ≤ **M** ≤ 10.

Large dataset (Test Set 2 - Hidden)

1 ≤ **N** ≤ 1000.
1 ≤ **M** ≤ 100.

Sample

Sample Input

```
2
2 2
1 4
0 0
0 1
3 2
1 2 3
0 1
1 2
```

Sample Output

```
Case #1:
1.000000000
2.000000000
Case #2:
1.414213562
2.449489743
```