Splines

Input file:	`standard input`
Output file:	`standard output`
Time limit:	15 seconds
Memory limit:	512 megabytes

You are given N points $x_1, ...x_N$, and M sets of values in these points: $y^1(x_1), ..., y^1(x_N), y^2(x_1), ...y^2(x_N), ..., y^M(x_1), ..., y^M(x_N)$. You are also given K other points $\hat{x}_1, ..., \hat{x}_K$.

For each of M sets, you must build natural 3rd-degree spline y^i_s, and compute the values of each spline at points $\hat{x}_j$: $y^i_s(\hat{x}_j)$.

Point coordinates and function values are double-precision floating-point numbers.

The points x_i are listed in strictly increasing order: $x_i < x_{i+1}$.

The points $\hat{x}_j$ are guaranteed to lie somewhere between points from the first set (or coincide with them): $x_1 \le \hat{x}_j \le x_N$. They are not guaranteed to be in increasing order.

The output precision is checked up to 7 significant digits.

Input

The first line contains single integer: the number of points $N = 1..10000$.

The next line contains N floating point values $x_1, ..., x_N$.

The next line contains single integer: the number of value sets $M = 1..1000$.

Each of next M lines contains N floating point values $y^i_1, ..., y^i_N$, $i = 1..M$.

After that, the line contains single integer $K = 1..10000$.

The next line contains N floating point values $\hat{x}_1, ..., \hat{x}_K$.

Example:

```
10
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
3
0.0 0.5877852522924731 0.9510565162951535 0.9510565162951535 0.5877852522924732
1.2246467991473532e-16 -0.5877852522924734 -0.9510565162951535 -0.9510565162951536
-0.5877852522924734
1.0 0.8090169943749475 0.30901699437494745 -0.30901699437494756 -0.8090169943749473
-1.0 -0.8090169943749472 -0.30901699437494756 0.30901699437494723 0.8090169943749473
0.0 0.1 0.2 0.30000000000000004 0.4 0.5 0.6000000000000001 0.7000000000000001 0.8 0.9
9
0.05 0.15 0.25 0.35 0.45 0.55 0.65 0.75 0.85
```

Output

The output should contain M lines of K values each. The value in position j on line i should be $y^i_s(\hat{x}_j)$, *i.e.* the value of the i-th spline computed at point $\hat{x}_j$.

Example (corresponding to the input example above):

```
0.3088791538716377 0.8086540467262824 0.9995568084495542 0.8086400012457524
0.30893533579375737 -0.3090898360795863 -0.8078674998166081 -1.0024923138803028
-0.7976845264324319
0.9319662914399691 0.5925249845080666 -0.0013456361131560868 -0.5871424400554418
-0.9508051970241554 -0.9503148792696466 -0.5886133933189681 0.0040478591864412305
0.5724219565732039
0.05 0.15000000000000002 0.25 0.35000000000000003 0.45 0.55 0.6500000000000001
```

```
0.7500000000000001 0.8500000000000001
```