Cycle Function

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	256 megabytes

Fish is learning functions! He has a linear function $f(x) = Ax + B$ and N numbers $x_1, x_2, \cdots, x_N$. Now he is curious about for each function $g(x)$ in

$$\left\{ \begin{array}{c} g_1(x) = c_1 x + d_1 \\ g_2(x) = c_2 x + d_2 \\ \vdots \\ g_M(x) = c_M x + d_M \end{array} \right\}$$

how to calculate the difference between $f(g(x))$ and $g(f(x))$.

As smart as Fish is, he soon comes up with a function $D(x) = |f(g(x)) - x| + |g(f(x)) - x|$ and uses the sum over $x_1, x_2, \cdots, x_N$ as the difference.

Can you tell him all the differences immediately?

Input

The first line of input contains an integer T, representing the number of test cases.

Then for each test case:

The first line contains two integers N, M as mentioned above and then two real numbers A, B indicating the given function $f(x) = Ax + B$.

The second line contains N real numbers $x_1, x_2, \cdots, x_N$.

Then M lines follow, each line containing two real numbers c_i, d_i indicating a function $g_i(x) = c_i x + d_i$ mentioned above.

All numbers in the same line are separated by one space.

Output

For each test case, you should output **Case x:** in the first line, where x indicates the case number starting from 1.

Then M lines follow, the i-th line of which contains a real number representing the difference for given function $g_i(x)$.

Your answers will be considered correct if its absolute error does not exceed 10^{-6}.

Example

standard input	standard output
2 3 2 2.0 3.0 1.0 2.0 3.0 0.4 -2.0 0.6 -5.0 3 2 2.5 2.0 1.0 2.0 3.0 0.4 -2.0 0.6 -5.0	Case 1: 7.800000 28.200000 Case 2: 12.600000 36.900000

Note

$1 \leq T \leq 100$

$1 \leq N, M \leq 10^5$

$-100 \leq A, B, x_i, c_i, d_i \leq 100$

For 90% test cases: $\max(N, M) \leq 1000$