Problem E. Mannschaft

Input file:	mannschaft.in
Output file:	mannschaft.out
Time limit:	10 seconds
Memory limit:	256 mebibytes

When designing games, it's important to properly balance skill and randomness. If a higher skilled player always wins against a lower skilled player, the game will be too depressing. On the other hand, if the results are completely random, then there will be no satisfaction from winning the game.

In a newly designed game the skill of each player can be described by a floating-point number between 1 and 2, where 1 corresponds to a complete novice, and 2 to the best player ever. A player with skill s_1 will beat a player with skill s_2 with probability $\frac{s_1}{s_1+s_2}$ (there are no draws in this game).

Your team for this game consists of n players, with skills a_1, a_2, ..., a_n. The opposing team consists of m players, with skills b_1, b_2, ..., b_m. Each member of your team will play one game with each member of the opposing team, for a total of $n \times m$ games. What is the expected number of games won by each of your players?

Input

The first line of the input file contains two integers n and m, $1 \le n, m \le 10^6$. The second line contains n space-separated floating-point numbers between 1 and 2, with at most 8 digits after the decimal point, denoting the skills of your players. The third line contains m skills of the other team in the same format.

Output

Output n space-separated numbers: the expected number of games won for each of your players.

Your output will be considered correct if each number is within 10^{-8} absolute or relative error of the answer.

Examples

mannschaft.in	mannschaft.out
3 2 1.0 2.0 1.5 1.0 2.0	0.833333333333333 1.166666666666666 1.028571428571428