Problem M. Market

Time limit:	2 seconds
Memory limit:	1024 megabytes

Speculation in the real estate market is stressful work with unstable earnings. Would it help if you got a huge loan from your parents and could precisely predict apartment prices on selected days?

You start without an apartment, but your bank balance is 10^{100}. Since you lack a real estate agent license, you may own at most one apartment at a time. You have already spotted a specific apartment in a good location, and that is the one you may buy and then sell, possibly multiple times.

The industry portal MyHouse has published predicted intervals $[a_i, b_i]$ (with $a_i < b_i$) of the apartment's price for the next n days. The price of the apartment on the i-th day is a random **real number** c_i chosen uniformly at random from the interval $[a_i, b_i]$. By default, you learn the price c_i at the beginning of the i-th day. You must then decide whether to make a transaction. If you own the apartment, you may sell it for c_i, and if you do not own it, you may buy it for c_i.

Only today (before the first day) the MyHouse portal allows new users to learn the exact prices c_i for a chosen set of k days. That is, you now choose a set of k days and learn their prices, while for each of the remaining $n - k$ days you will learn the price at the beginning of that day.

After n days you must end without an apartment; your profit is the difference between your final and initial bank balance. Determine the maximum expected value[5] of the profit, if you optimally choose the set of k days and then optimally make transaction decisions on each of the n days.

Input

The first line contains two integers n and k ($0 \le k \le n \le 300\,000$; $1 \le n$), representing respectively the number of days and the number of prices you may learn immediately.

The next n lines describe price intervals; i-th line contains two integers a_i and b_i ($1 \le a_i < b_i \le 10^6$).

Output

Print one real number – the maximum possible expected value of the profit after n days.

The acceptable relative or absolute error is 10^{-6}. That is, if you print x and the correct exact result is y, then it must hold that $|x - y| \le 10^{-6} \cdot \max(1, y)$. You may print up to 20 digits after the decimal point.

[5]The expected value is the average value, weighted by probability, of a random variable. Intuitively, it is the result you would expect on average when repeating a random experiment many times.

Examples

standard input	standard output
4 0 10 30 10 30 40 50 30 60	28.75
4 1 10 30 10 30 40 50 30 60	31.3888888889
6 3 10 50 30 70 50 70 30 50 30 40 10 40	33.6805555556

Note

In the first test we have $k = 0$, so each price is learned at the beginning of its day. There exists an optimal strategy of buying the apartment on day 1 or 2 at an expected cost of 17.5, and then selling it on day 3 or 4 with an expected income of 46.25. The expected profit is $46.25 - 17.5 = 28.75$.

In the second test we have $k = 1$ and we should optimally choose day 4, so we immediately learn a real number c_4 from the interval $[30, 60]$. The expected profit is $31\frac{7}{18}$ for optimal transaction decisions.

In the third test the optimal choice of the set of k days is $\{2, 3, 6\}$. We immediately learn the prices c_2, c_3, and c_6.