Online (A)

Time: 25 minutes

Suppose the company is updating its Inventory Evaluation Policy. If the inventory level is found to be less than zero at the beginning of a month, it places an *express order* to the supplier [if 0 <= I(t) < s, the company still places a normal order]. An express order for Z items costs the company (E_K + E_i*Z) dollars, where E_K is the express order setup cost and E_i is the express order incremental cost, respectively. And for an express order, the delivery lag time is uniformly distributed on the interval [E_m, E_M], where E_m denotes the express order minlag period and E_M denotes the express maxlag period. You should compare the average costs for the company with and without express orders, and observe the expected number of express orders it places for a given (s, S) policy.

Input

You should take inputs from a text file.

- The first line of the input file would contain one integer *T* denoting the total number of trials to simulate the system.
- The first line would contain 3 space-separated numbers *I, N, P* denoting the *Initial Inventory Level, Total Number of Months* and *Number of Policies*, respectively.
- The next line would have 2 numbers *D, beta_D* as *The Number of Demand Sizes* and *The Mean Inter-demand Time in months*.
- The next line would have 4 numbers *K, i, h, pi* as the *Setup Cost* and *per-unit Incremental Cost, Holding Cost* & *Shortage Cost*.
- The next line would contain 2 space-separated numbers *E_K, E_i* as the *Express Order Setup Cost* and the *Express Order Incremental Cost* respectively.
- The next would have 2 numbers *m, M* as the *Minlag* and *Maxlag* periods in months.
- The next line would contain 2 space-separated numbers *E_m, E_M* as the *Express Order Minlag* and the *Express Order Maxlag period* in months.
- The next line would have *D* space-separated numbers specifying the cumulative probabilities of the sequential demand sizes (i.e. for demand sizes of 1, 2, …, D).
- The next *P* lines each would have 2 space-separated numbers *s, S* denoting the respective policies.

Output

In the output file, you would show the Average (over *T* trials) Total Costs without placing any express orders, and with placing the express orders as required, for all the given policies. Also for each policy, you need to show the expected (average) number of express orders if placed, over the *N* months period.

See the Sample I/Os for further clarification.