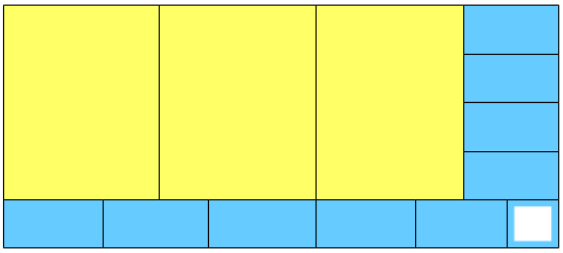
IT300 Lab Test 3 (13 Nov 2020)

Cutting Metal.

You are given a rectangular piece of metal with dimensions X × Y , where X and Y are positive integers, and a list of n products that can be made using the metal. For each product i ∈ [1, n] you know that a rectangle of metal of dimensions $a_i \times b_i$ is needed and that the final selling price of the product is c_i . Assume the a_i , b_i , and c_i are all positive integers. You have a machine that can cut any rectangular piece of metal into two pieces either horizontally or vertically. Note that a cut is always complete (and not partial) i.e. given a rectangular piece of metal, a machine cut will produce two separate pieces.

Design an algorithm that determines the best return on the X × Y piece of metal, that is, a strategy for cutting the metal so that the products made from the resulting pieces give the maximum sum of selling prices. You are free to make as many copies of a given product as you wish, or none if desired.



For e.g. for the above piece of metal of dimension 5 x 11 sq units and for three products of dimensions 1 x 2, 3 x 4 and 5 x 10 with costs 5, 100 and 20 respectively the best obtainable price is 345 got by three 3x4 pieces (in yellow) and nine 1x2 pieces(in blue) giving a total price of 3x100+9x5 = 345.

(You can assume that X, Y, a_i, b_i , c_i are all less than 50 and n is less than 10. You may further assume that the shapes of all the n products are different.)

Input:
The first line of the input should specify the values of X and Y. The next line specifies n, the number of different products. The following lines specify the dimensions of each product and its cost, (a_i , b_i , c_i) with one line for each product.

Output:
The output should be the maximum selling price obtainable by cutting the metal into different shapes.

Sample Input:
5 11
3
1 2 5
3 4 100
5 10 20

Sample Output:
345