Week 7 Graded Problem - Quiz 4

Topic: Greedy Programming

After your last adventure, you're continuing on your mission to explore strange new worlds, to seek out new life and new civilizations, and to boldly go where no man has gone before.

While traveling in deep space you encountered a planet. By the time you decided to approach the planet, you picked up a strange transmission. You were unable to decode the transmission but you located its source successfully. In that location, you saw a man next to a spaceship. He seemed like he was waiting for someone. Finally, you finish the landing sequence and hear him murmuring:
"Oh, Klapaucius where were you all this time? I am dealing with an emergency here and I need your help immedi-", he looks shocked when he sees you and does not finish his sentence.
"Who are you and where is Klapauicus? Never mind, there is no time for a proper meeting. I am Trurl the magnificent, the most famous constructor in the universe. I am dealing with an emergency here, both of us are in danger because of the probability dragons. Please hear my offer, I have a lot of containers in my ship, each filled up with the different amount of treasure chests I got from King Krool.
I will also give you a *list* of containers. The list contains $\boldsymbol{M}$ containers. In the $\boldsymbol{i^{th}}$ container, there are $\boldsymbol{a_i}$ chests, and each chest contains $\boldsymbol{b_i}$ amount of the treasure. In return, you will help me deal with the probability dragons situation."
Since you know that dragons don't exist (Everyone knows that dragons don't exist), you accept his offer. However, you realize that you can not take all of the treasure chests because your ship can only take a ***limited number of chests***. Thus, you want to choose $\boldsymbol{N}$ chests that will result in the maximum treasure gain.

You are given an input file that contains the number of containers, the chest limit of your ship, and the list of containers. The Java code for reading the input file is already given to you, hence you are only expected to write the algorithm that returns the maximum treasure gain.

Input

The inputs will be given as command-line arguments to your Main class in the following format:

```
java Main <inputfile>
```

For example, to run your program on testcase.txt, the following run command will be issued:

```
java Main testcase.txt
```

Output

You are expected to output only an integer, the maximum treasure gain, to the STDOUT. For example, for the given sample run command and the Sample Test Case #1 your output should be:

```
62
```

Input File Organization and Constraints

N M
a_1 b_1
...
a_i b_i
...
a_M b_M

Where,
$1 \leq N \leq 2 * 10^8$
$1 \leq M \leq 20$
$1 \leq a_i \leq 10^8$
$1 \leq b_i \leq 10$

Important rules

Implement all your code in a single public class called Main and submit only your **Main.java** file zipped directly under <**studentID**>**.zip**

Sample Test Case #1

Input:
7 3
5 10
2 5
3 6

Output:
62

Explanation:
The limit of the spaceship is 7 chests. To make the maximum gain, 5 chests with 10 treasure amount and 2 chests with 6 treasure amount can be selected. Maximum gain is: 10 + 10 + 10 + 10 + 10 + 6 + 6 = 62

Sample Test Case #2

Input:
3 3
1 3
2 2
3 1

Output:
7

Explanation:
The limit of the spaceship is 3 chests. To make the maximum gain, 2 chests with 2 treasure amounts and 1 chest with 3 treasure amounts can be selected. Maximum gain is: $2 + 2 + 3 = 7$

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Because of your deal with Trurl, you will learn the mystery behind the dragons next week.