Knapsack

ZPRAC-16-17-Lab10

[40 points]

While exploring the jungles of Africa an adventurer stumbles upon a treasure trove filled with priceless jewels. However, he can only carry back some of it weighs too much. He wants to make sure that he carries back jewels worth the maximum possible amount given his limited carrying capacity. Can you help him?

You are given the values and weights of N objects. You are also given a capacity C. You have to select objects such that their total weight does not exceed C and their total value is the maximum possible.

INPUT FORMAT:

C (int) --- Capacity
N (int) --- Number of objects
v1 w1 --- value and weight of object 1
v2 w2 --- value and weight of object 2
.
.
.
vN wN --- value and weight of object N

OUTPUT FORMAT:

M --- Maximum possible value

EXAMPLE:

INPUT:
50
3
60 20
100 10
120 30

OUTPUT:
220

Explanation: You cannot select all three since their total weight becomes 60 (greater than 50). So you can only select 2 objects. If we choose 1 & 2, then our value is 60+100=160 (weight 20+10=30), for objects 2 & 3, we get 100+120=220 (weight 10+30=40) and for 1 & 3 we have 60+120=180 (weight 20+30=50). Thus the maximum possible value is 220.

NOTE: Use recursion, but take care of overlapping calls.