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Practical 4: Implementation of Fractional Knapsack using Greedy Approach

Code:

```
import operator

n = int(input('Enter the number of items: '))
profit = list(map(int,input('Enter the profit values: ').split()))
weight = list(map(int,input('Enter the weight values: ').split()))
m = int(input('Enter the maximum capacity: '))
l = []

for i in range(n):
    l.append([profit[i],weight[i],profit[i]*1.0/weight[i]])
    l = sorted(l,reverse=True,key=operator.itemgetter(2))

max_profit =0
fractional_index =0
for i in range(n):
    if m>0 and l[i][1]<m:
        max_profit+=l[i][0]
        m -= l[i][1]
    else :
        fractional_index = i
        break
if m>0:
    max_profit+=m*(l[fractional_index][0])/(l[fractional_index][1])
    print(max_profit)
```

Output:

Test Case 1

```
Enter the number of items: 3
Enter the profit values: 10 20 15
Enter the weight values: 3 2 5
Enter the maximum capacity: 5
30.0
```

Test Case 2

```
Enter the number of items: 4
Enter the profit values: 20 10 25 40
Enter the weight values: 10 8 40 45
Enter the maximum capacity: 50
58.44444444444444
```

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PAGE No.
DATE / /

Postlab Exp 4 : Fractional knapsack

Q1

① Greedy algorithm derives solution step by step, by looking at the information available at the current moment.
② It does not look at future prospect.
③ Decisions are completely locally optimal.
④ This method constructs the solution simply by looking at current benefit without exploring future possibilities and hence they are known as greedy.
⑤ A choice made at each step in greedy method should be

a) Feasible : Choice should satisfy problem constraints
b) Locally Optimal : Best solution from all feasible solution at current stage should be selected
c) Irrevocable : Once choice is made it cannot be altered i.e. if a feasible solution is selected / rejected in step ① it cannot be selected / rejected in subsequent steps.