Name: Pheakdey Luk **Assignment 11**

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R-5.1 Let S = {a, b, c, d, e, f, g} be a collection of objects with benefit-weight values as follows: a:(12,4), b:(10,6), c:(8,5), d:(11,7), e:(14,3), f:(7,1), g:(9,6). What is an optimal solution to the fractional knapsack problem for S assuming we have a sack that can hold objects with total weight 18? Show your work.

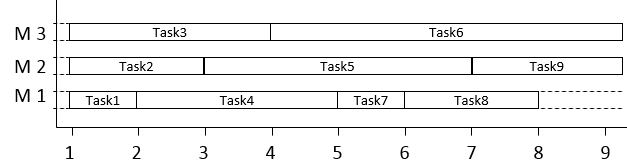
**Answer**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | a:(12,4) | b:(10,6) | c:(8,5) | d:(11,7) | e:(14,3) | f:(7,1), | g:(9,6) |
| Weight | 4 | 6 | 5 | 7 | 3 | 1 | 6 |
| Benefit | 12 | 10 | 8 | 11 | 14 | 7 | 9 |
| **V/W** | **3** | **1.67** | **1.6** | **1.57** | **4.67** | **7** | **1.5** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | f | e | a | b | c | d | g |
| V/W | 7 | 4.67 | 3 | 1.67 | 1.6 | 1.57 | 1.5 |
| Weight Left | 18-1=17 | 17-3=14 | 14-4=10 | 10-6=4 | (4/5)\*8=6.4 |  |  |
| **Optimal Solution= {f,e,a,b,c}={**(7, 1), (14, 3), (12, 4), (10, 6), (6.40, 4)**}** | | | | | | | |
| **Total Weight = 49.4** | | | | | | | |

R-5.3 Suppose we are given a set of tasks specified by pairs of the start times and finish times as T = {(1,2),(1,3),(1,4),(2,5),(3,7),(4,9),(5,6),(6,8),(7,9)}. Solve the task scheduling problem for this set of tasks.

**Answer:**



R-5-11 Solve Exercise R-5.1 for the 0-1 Knapsack Problem.

Answer:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1(a) | 0 | 0 | 0 | 0 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 2(b) | 0 | 0 | 0 | 0 | 12 | 12 | 12 | 12 | 12 | 12 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 3(c) | 0 | 0 | 0 | 0 | 12 | 12 | 12 | 12 | 12 | 20 | 22 | 22 | 22 | 22 | 22 | 30 | 30 | 30 | 30 |
| 4(d) | 0 | 0 | 0 | 0 | 12 | 12 | 12 | 12 | 12 | 20 | 22 | 23 | 23 | 23 | 23 | 30 | 31 | 33 | 33 |
| 5(e) | 0 | 0 | 0 | 14 | 14 | 14 | 14 | 26 | 26 | 26 | 26 | 26 | 34 | 36 | 37 | 37 | 37 | 37 | 44 |
| 6(f) | 0 | 7 | 7 | 14 | 21 | 21 | 21 | 26 | 33 | 33 | 33 | 33 | 34 | 41 | 43 | 44 | 44 | 44 | 44 |
| 7(g) | 0 | 7 | 7 | 14 | 21 | 21 | 21 | 26 | 33 | 33 | 33 | 33 | 34 | 41 | 43 | 44 | 44 | 44 | 44 |

R-5-12 Sally is hosting an Internet auction to sell n widgets. She receives m bids, each of the form “I want ki widgets for di dollars,” for i = 1, 2, ..., m. Characterize her optimization problem as a knapsack problem. Under what conditions is this a 0-1 versus fractional problem?

**Answer:**

Here you can't split the widgets into partial part. That's why it is not fractional knapsack problem. So this is should be 0-1fractional problem.