

1. Given a set of items and knapsack capacity = 60 kg, find the optimal solution, for the fractional knapsack problem by using greedy approach.

a. Show the sorted table by ratio

Item	Value	Weight	Ratio
A	60	10	6
B	100	20	5
C	120	30	4
D	80	24	3.33
E	30	6	5
F	50	10	5

Item	Value	Weight	Ratio
A	60	10	6
B	100	20	5
F	50	10	5
E	30	6	5
C	120	30	4
D	80	24	3.33

b. Show the table containing the added items (with decreasing capacity and increasing value)

Knapsack Weight	Items in the Knapsack	Cost
60	{ }	0
$60 - 10 = 50$	A	60
$50 - 20 = 30$	A, B	$60 + 100 = 160$
$30 - 10 = 20$	A, B, F	$160 + 50 = 210$
$20 - 6 = 14$	A, B, F, E	$210 + 30 = 240$
$14/30 = \frac{7}{15}$	A, B, F, E, $\frac{7}{15}C$	$240 + 7/15(120) = 296$

C. Show the final list of items added in the bag with the total value.

Knapsack = {A, B, F, E, $\frac{7}{15}$ C}

Total Value = **296**

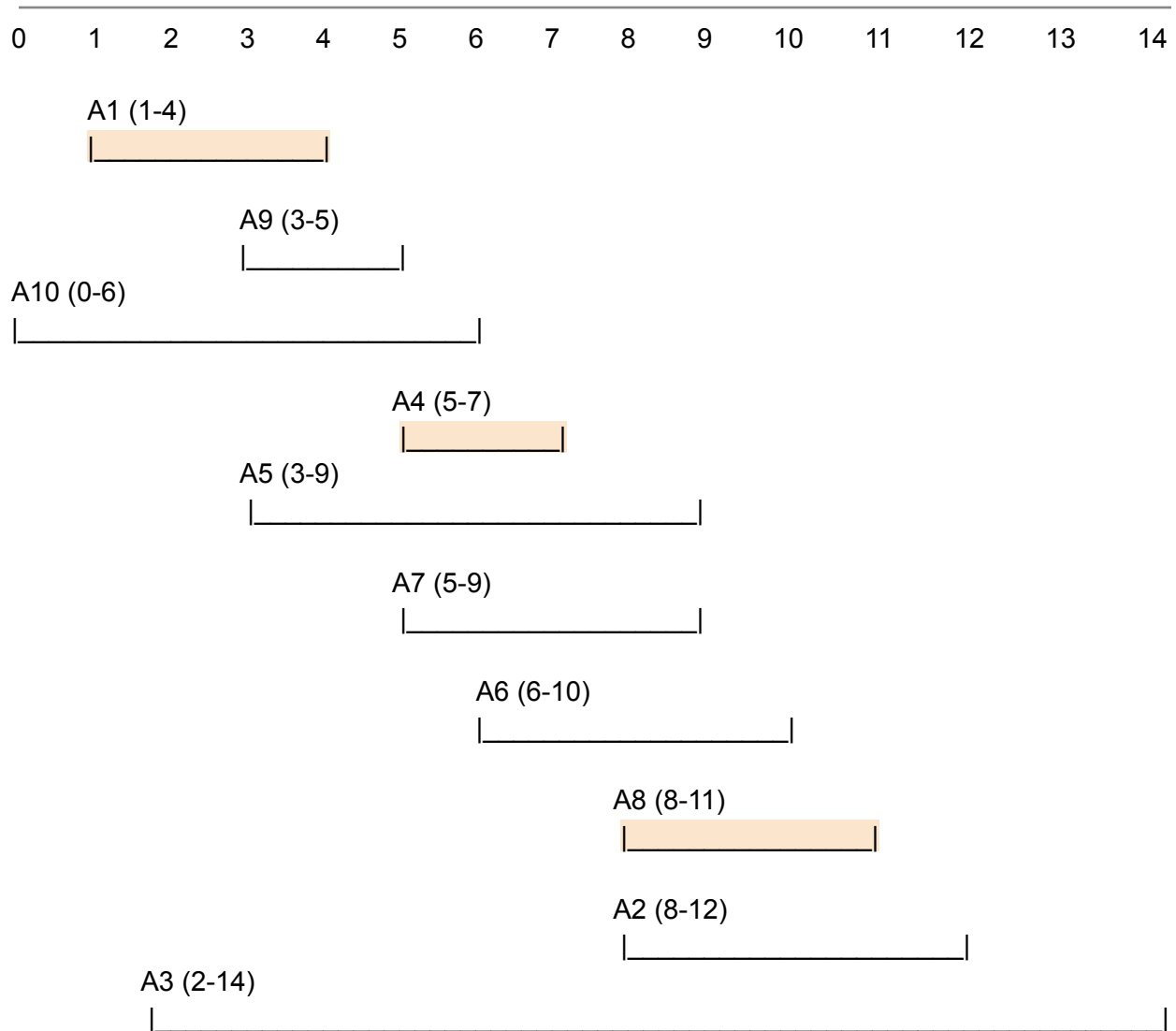
2. Given the following activity sets:

Activity	Start	Finish
A1	1	4
A2	8	12
A3	2	14
A4	5	7
A5	3	9
A6	6	10
A7	5	9
A8	8	11
A9	3	5
A10	0	6

a. Show the sorted table.

Sorted Activity	A1	A9	A10	A4	A5	A7	A6	A8	A2	A3
Start	1	3	0	5	3	5	6	8	8	2
Finish	4	5	6	7	9	9	10	11	12	14

- b. Find the maximum number of non-overlapping activities you can select.



- c. List the set of non-overlapping activities that you can include.

Sorted Activity	A1	A9	A10	A4	A5	A7	A6	A8	A2	A3
Start	1	3	0	5	3	5	6	8	8	2
Finish	4	5	6	7	9	9	10	11	12	14

Selected Activity	A1
Start	1
Finish	4

Selected Activity	A1	A4
Start	1	5
Finish	4	7

Selected Activity	A1	A4
Start	1	5
Finish	4	7

Sorted Activity	A1	A9	A10	A4	A5	A7	A6	A8	A2	A3
Start	1	3	0	5	3	5	6	8	8	2
Finish	4	5	6	7	9	9	10	11	12	14

Selected Activity	A1	A4	A8
Start	1	5	8
Finish	4	7	11

Sorted Activity	A1	A9	A10	A4	A5	A7	A6	A8	A2	A3
Start	1	3	0	5	3	5	6	8	8	2
Finish	4	5	6	7	9	9	10	11	12	14

Selected Activity	A1	A4	A8
Start	1	5	8
Finish	4	7	11

3. Determine the pairings using the Gale-Shapley Algorithm.

MEN

Betts	Mia	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Betts

MEN

Betts	Mia	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Pajes

MEN

Betts	Mia	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey

Smith	Cassey	Mia	Kate	Hailey
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WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Conforto

MEN

Betts	Mia	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Smith

MEN

Betts	Mia	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes

Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Betts

MEN

Betts	Mia ✕	Kate	Hailey	Cassey
Pajes	Kate	Mia	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Pajes

MEN

Betts	Mia ✕	Kate	Hailey	Cassey
Pajes	Kate ✕	Mia ✕	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey	Mia	Kate	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Smith

MEN

Betts	Mia ✕	Kate	Hailey	Cassey
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Pajes	Kate ✕	Mia ✕	Cassey	Hailey
Conforto	Mia	Cassey	Kate	Hailey
Smith	Cassey ✕	Mia ✕	Kate ✕	Hailey

WOMEN

Mia	Conforto	Pajes	Betts	Smith
Kate	Betts	Conforto	Smith	Pajes
Hailey	Smith	Conforto	Betts	Pajes
Cassey	Betts	Conforto	Pajes	Smith

Pairings: **Mia - Conforto, Kate - Betts, Hailey - Smith, Cassey - Pajes**

4. Find the minimum number of subsets required in order to cover all areas.

Camera Location	Area
S1	1,3,4,6,7
S2	4,7,8,12
S3	2,5,9,11,13
S4	1,2,14,15
S5	3,6,10,12,14
S6	8,14,15
S7	1,2,6,11
S8	1,2,4,6,8,12

S2				X			X	X				X				1
S3		X			X				X		X		X			0
S4	X	X												X	X	2
S5			X			X				X		X		X		3
S6								X						X	X	2
S7	X	X				X					X					0
S8	X	X		X		X		X				X				0
	X	X		X	X	X		X	X		X	X	X			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
S1	X		X	X		X	X									1
S2				X			X	X				X				1
S3		X			X				X		X		X			0
S4	X	X												X	X	1
S5			X			X				X		X		X		0
S6								X						X	X	1
S7	X	X				X					X					0
S8	X	X		X		X		X				X				0
	X	X	X	X	X	X		X	X	X	X	X	X	X		

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
S1	X		X	X		X	X									0
S2				X			X	X				X				0
S3		X			X				X		X		X			0
S4	X	X												X	X	1
S5			X			X				X		X		X		0

S6								X						X	X	1
S7	X	X				X					X					0
S8	X	X		X		X		X				X				0
	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
S1	X		X	X		X	X									0
S2				X			X	X				X				0
S3		X			X				X		X		X			0
S4	X	X												X	X	0
S5			X			X				X		X		X		0
S6								X						X	X	1
S7	X	X				X					X					0
S8	X	X		X		X		X				X				0
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

b. List the subsets.

{S1, S3, S4, S5, S8}