SUSTech Southern University of Science and Technology

Advanced Algorithm Assignment 7

12032189 Yuxi Liu

Exercise 7-1

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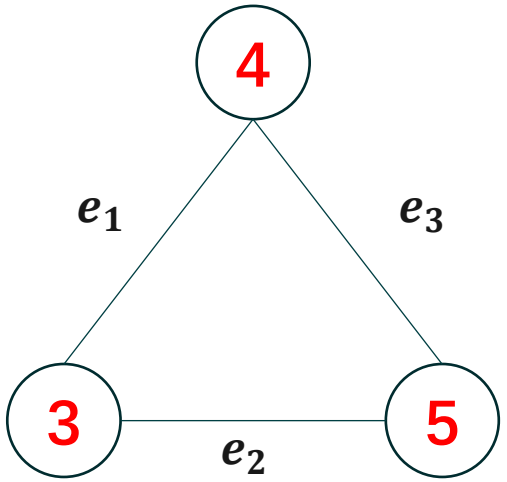
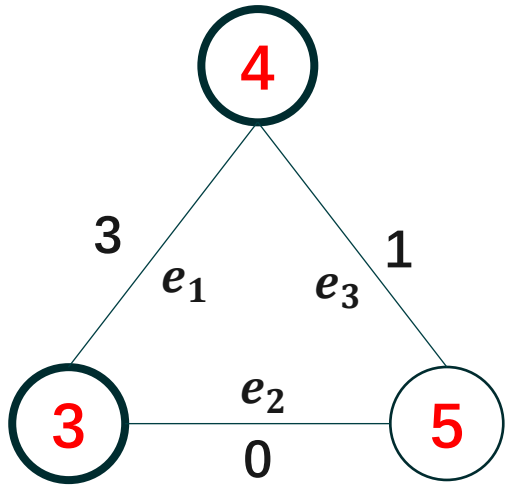
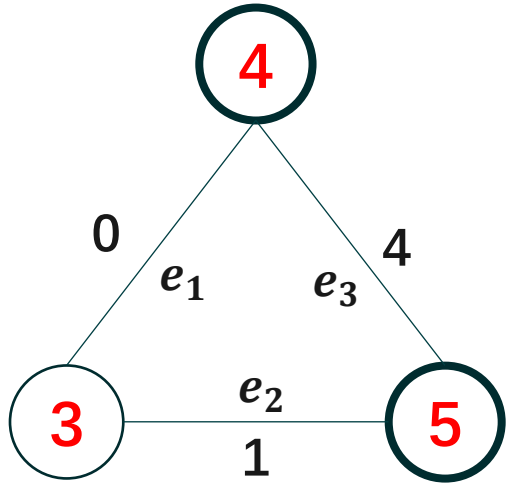
Examine the dependency of the result S on the order of edges in which edges are selected to increase p_e.That is, create an example of the vertex cover problem where different results are obtained depending on the order of edges.





Orders = $\{e_1, e_3, e_2\}$

Total weight = 7



Orders = $\{e_3, e_2, e_1\}$

Total weight = 9

Exercise 7-2

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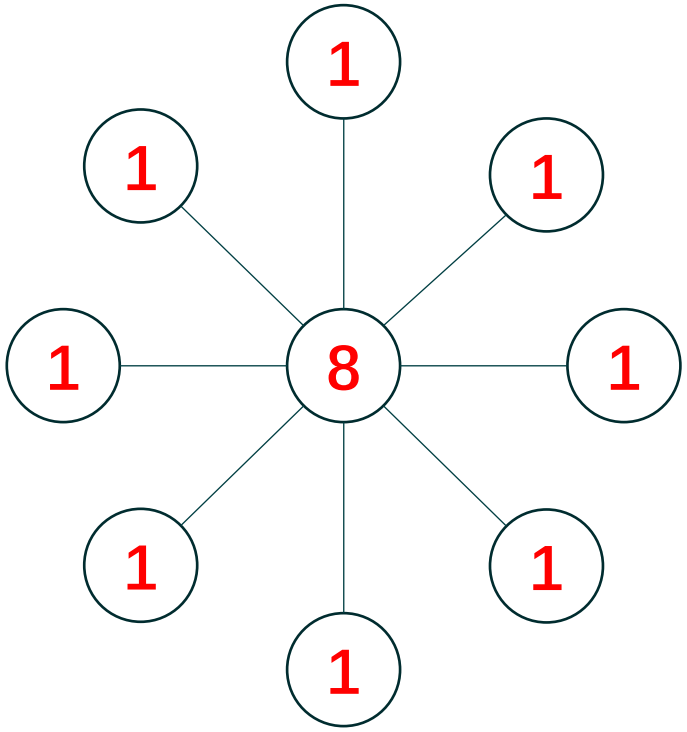
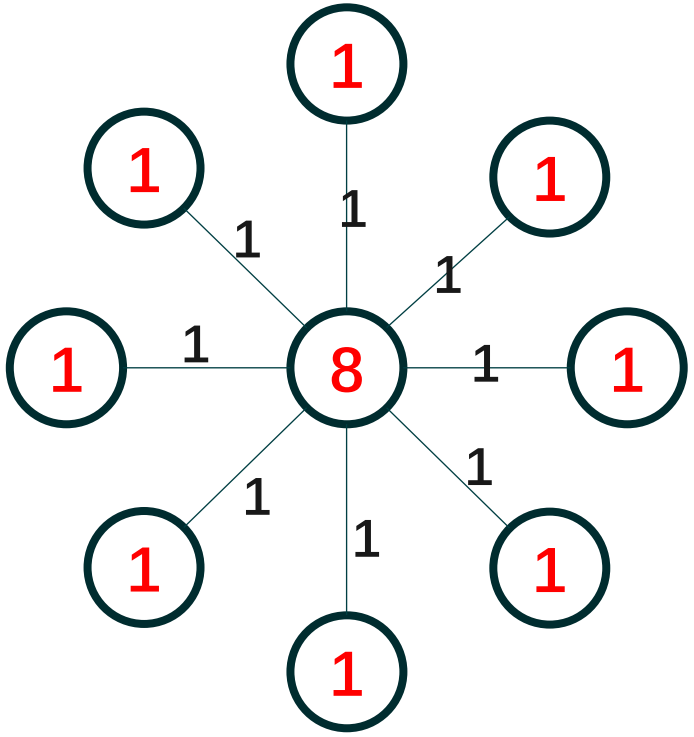
Create an example of the vertex cover problem where a good solution is not obtained by the pricing method (i.e., the obtained solution w(S) is close to 2w(S^*).

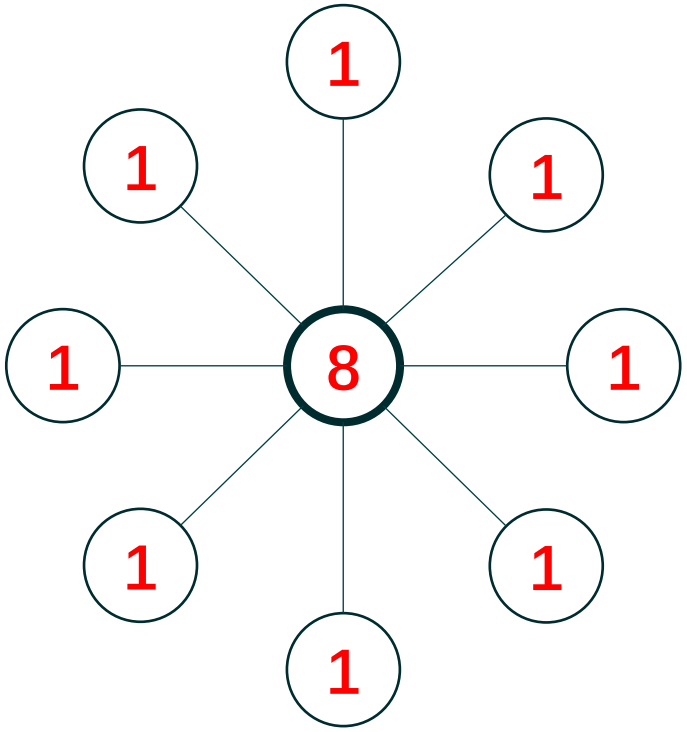


Pricing Method:



Total weight = 16

optimal:



Total weight = 8

Exercise 7-3

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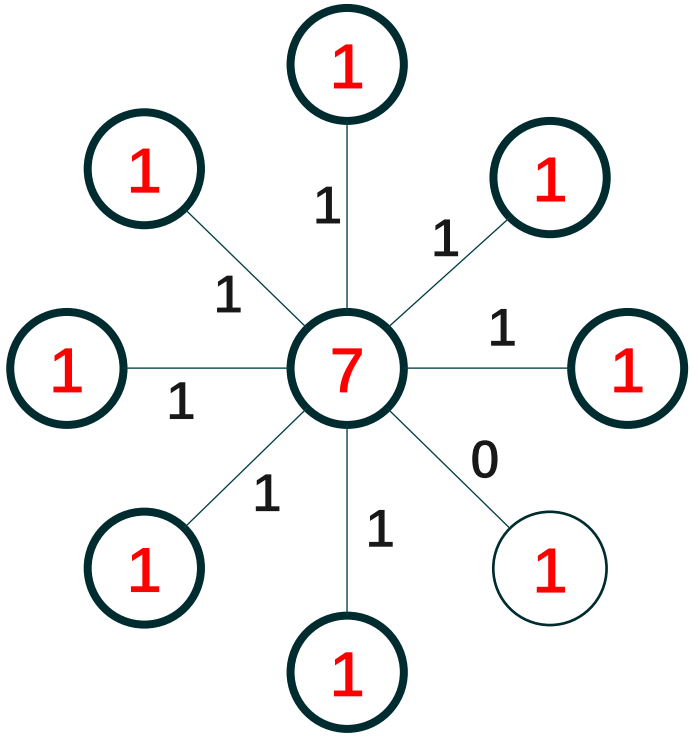
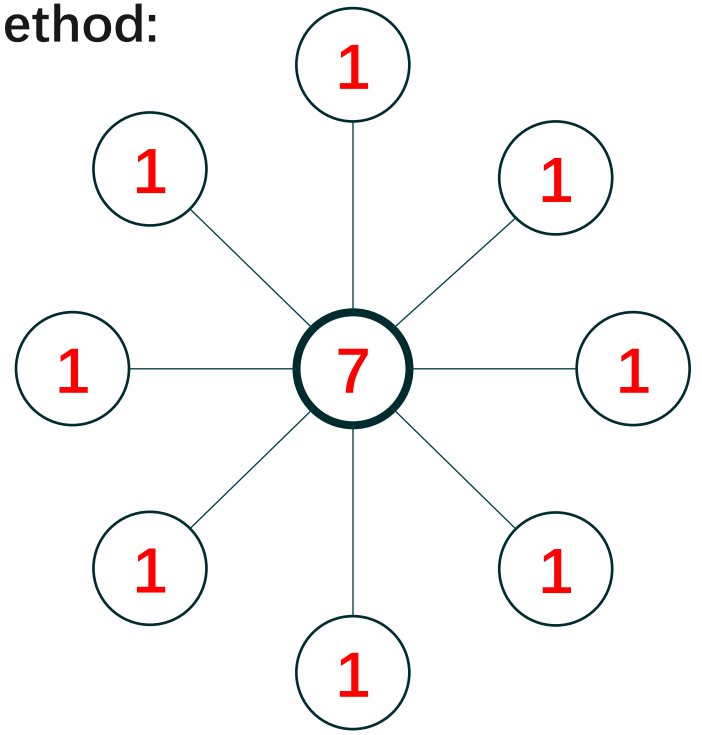
Create an example of the vertex cover problem where better results are always obtained (independent of the order) by the greedy set cover algorithm than the pricing method.

Pricing Method:



Total weight = 14

Greedy Method:



Total weight = 7

Exercise 7-4

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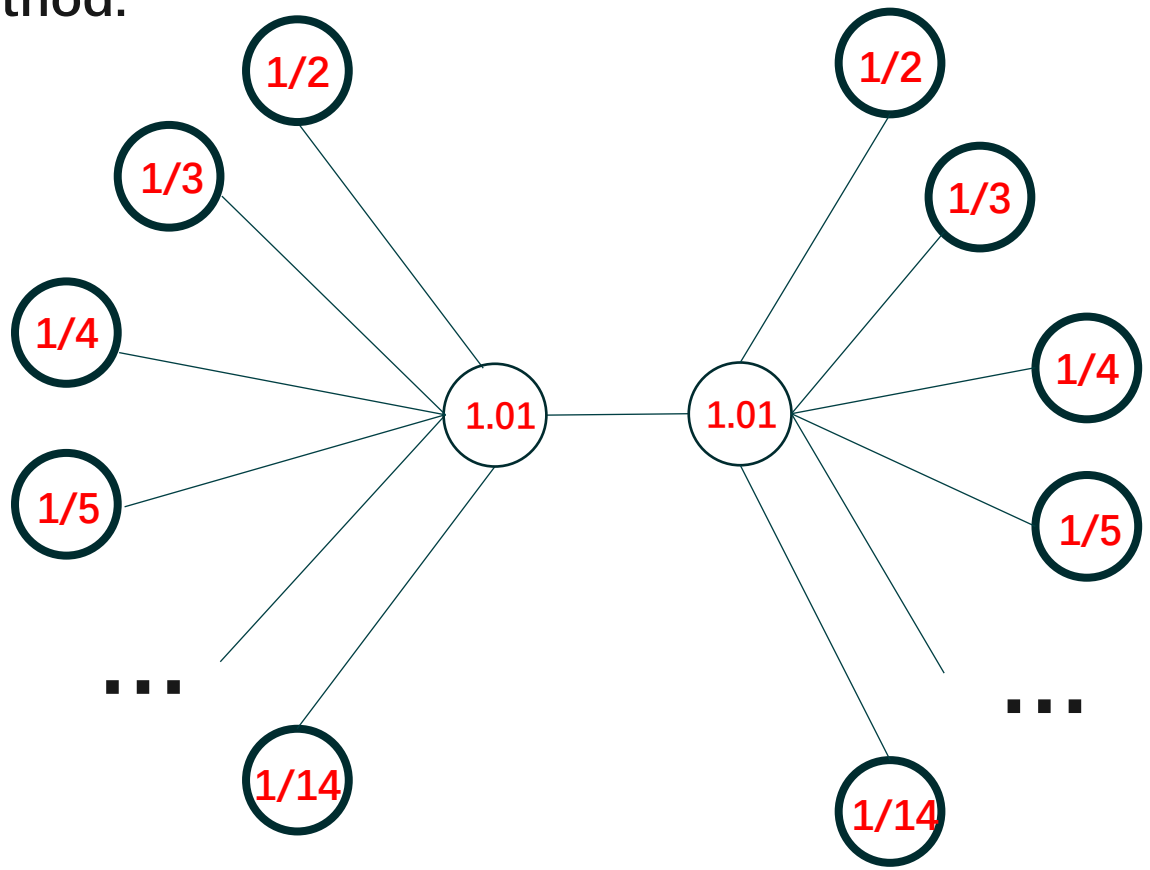
Create an example of the vertex cover problem where better results are always obtained (independent of the order) by the pricing method than the greedy set cover algorithm.

Greedy Method:



$W(S_G) \approx 4.36$

Exercise 7-4

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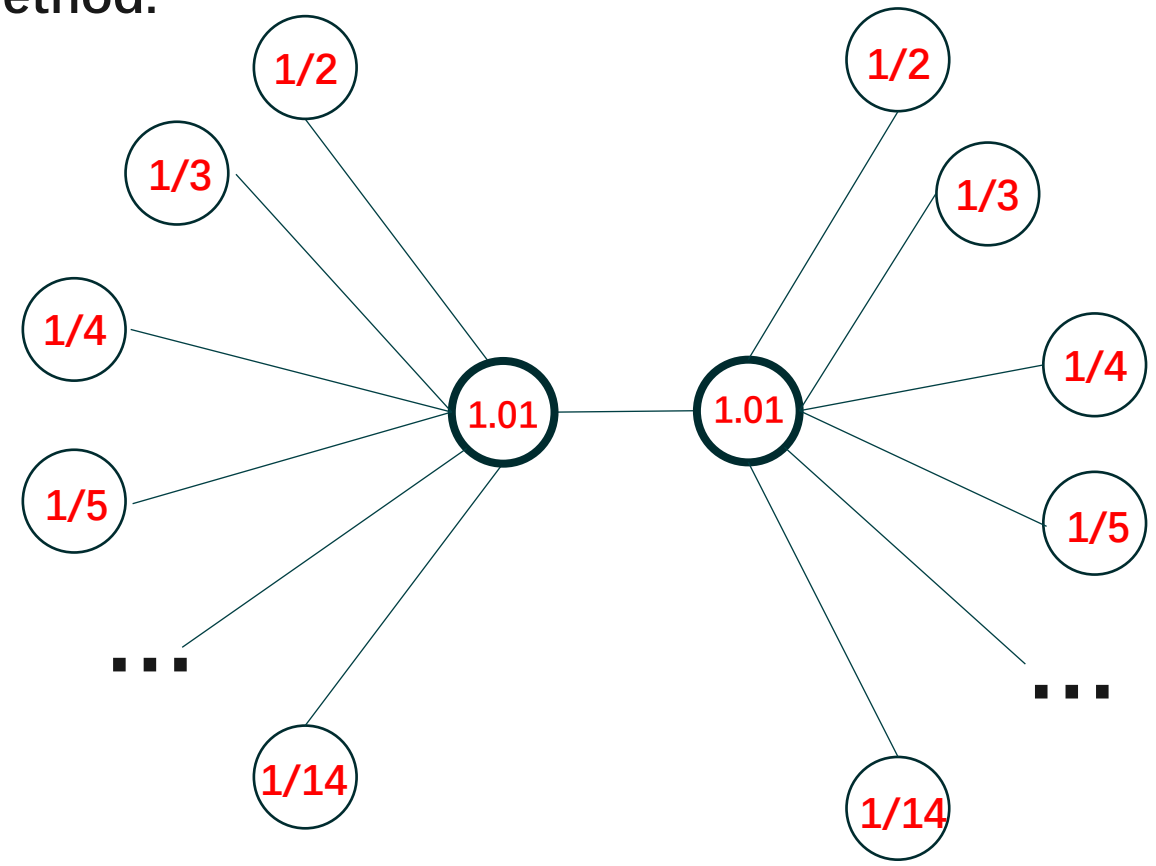
Create an example of the vertex cover problem where better results are always obtained (independent of the order) by the pricing method than the greedy set cover algorithm.

Optimal Method:



$$w(S^*) = 2.02$$

Exercise 7-4

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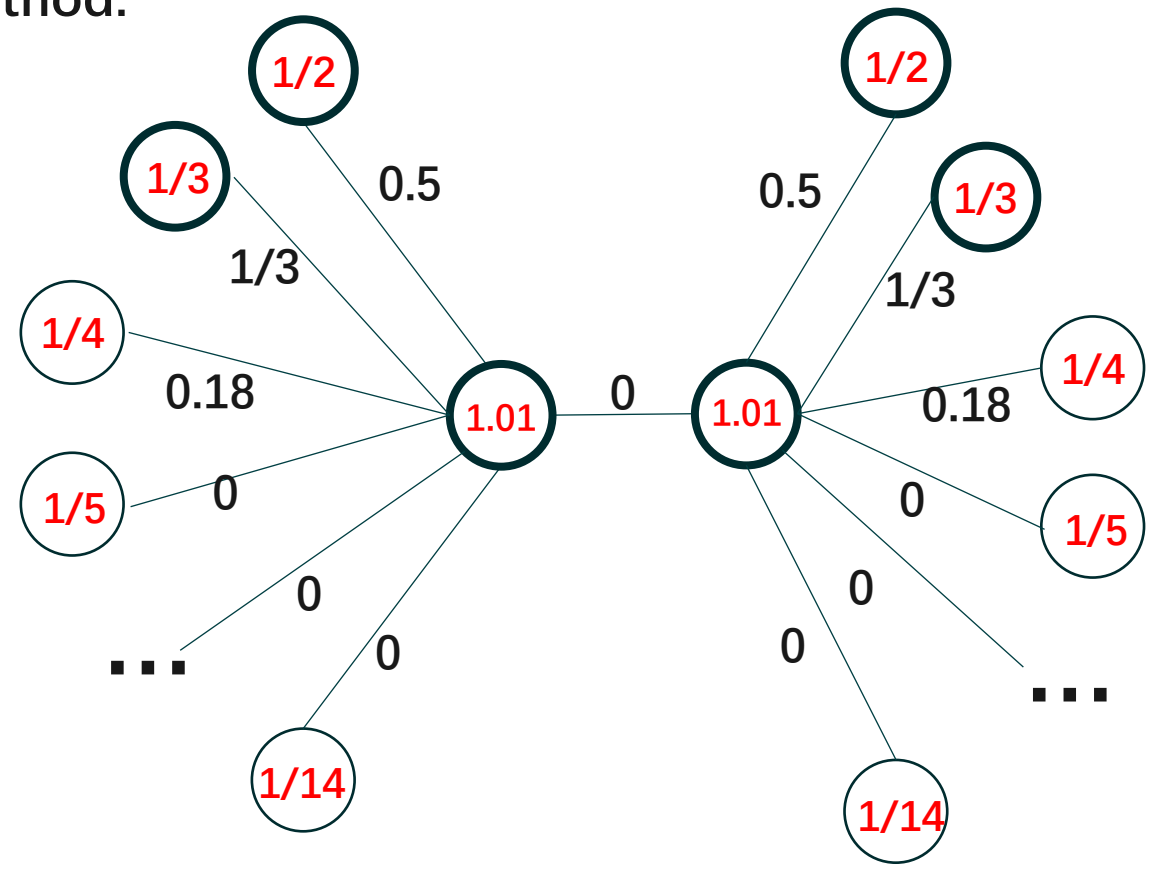
Create an example of the vertex cover problem where better results are always obtained (independent of the order) by the pricing method than the greedy set cover algorithm.

Pricing Method:



$$w(S_P) \approx 3.69 \leq 2 * w(S^*) = 4.04 < w(S_G) = 4.36$$

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THANK YOU

Exercise 7-4

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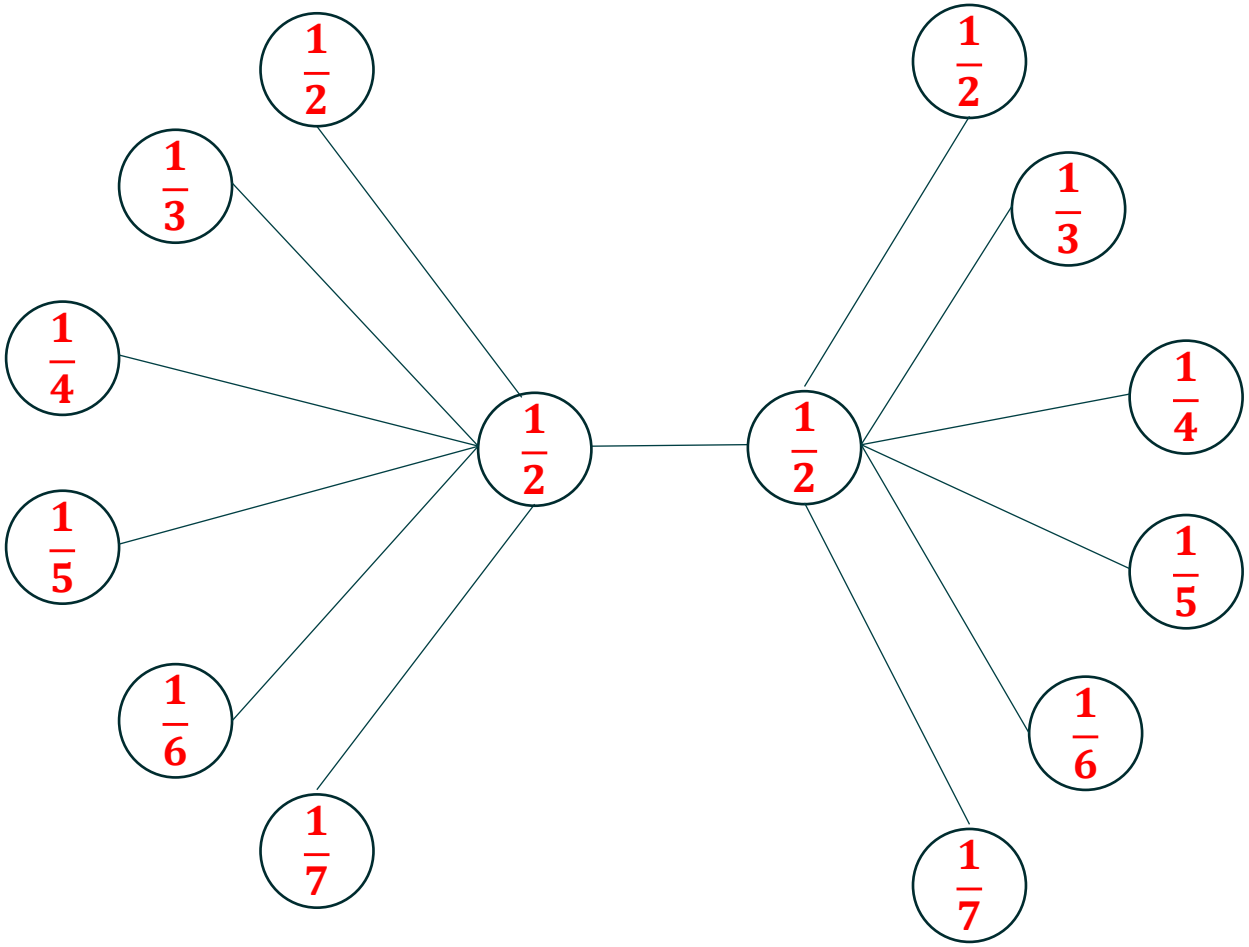

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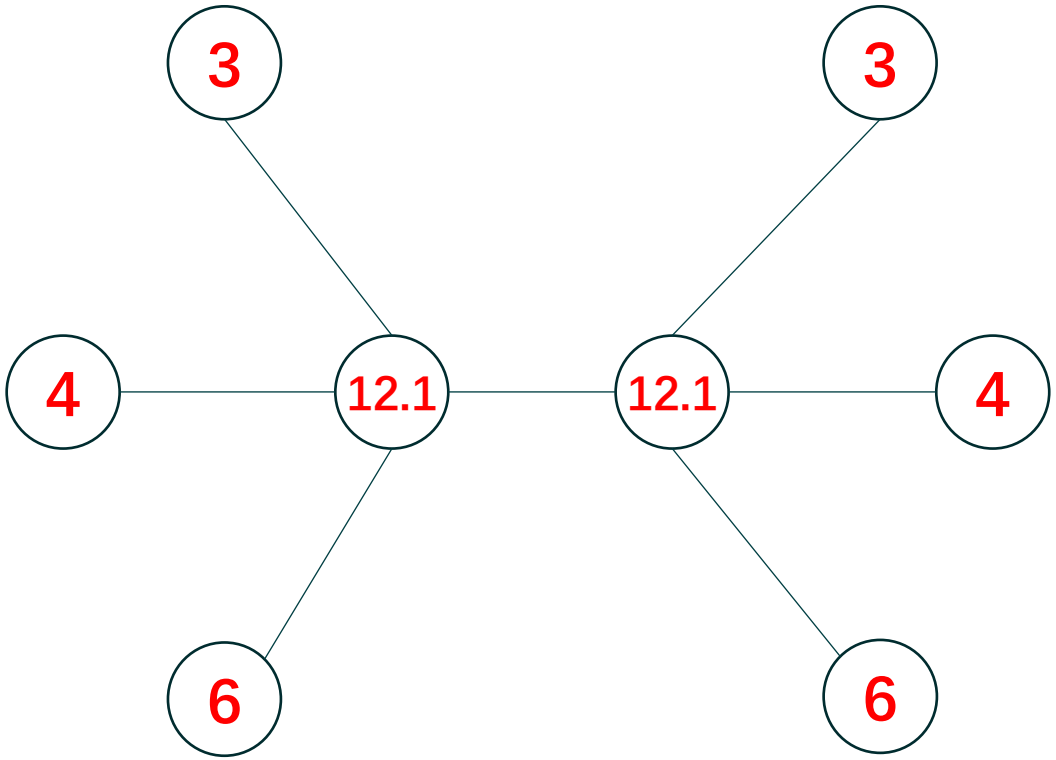

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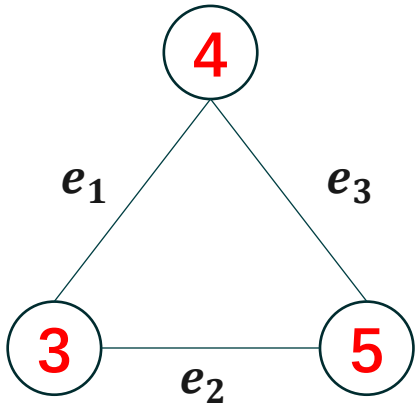

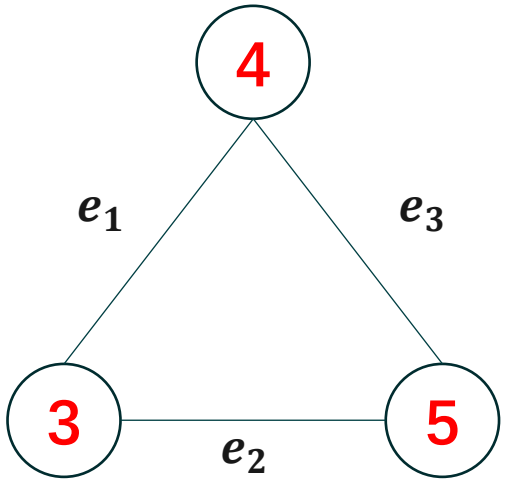

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