Property Demonstration on the Algorithms Addressing Vertex Cover Problem with Various Examples

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Recent Research Topic: Generative Model
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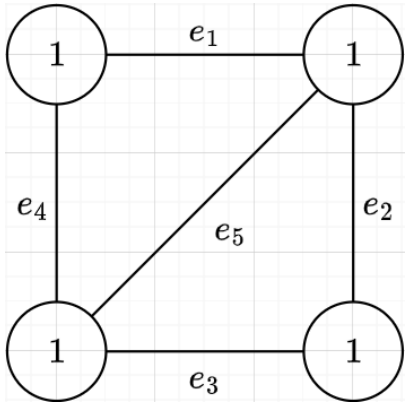
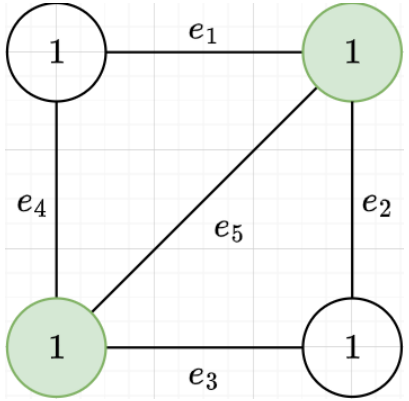
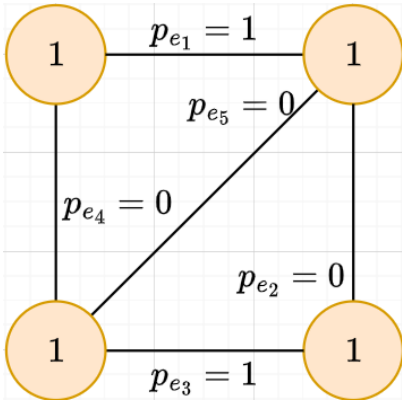
Task 11-1

Consider all 4 points with 5 edges in a graph.

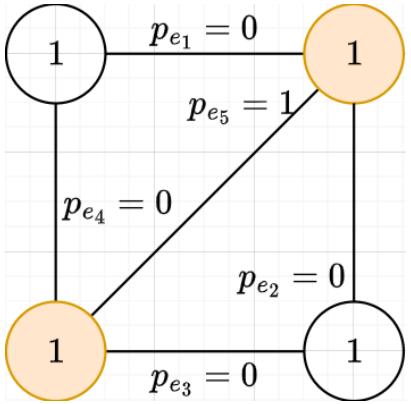




Greedy
$w = 2$



Pricing #1
$w = 4$

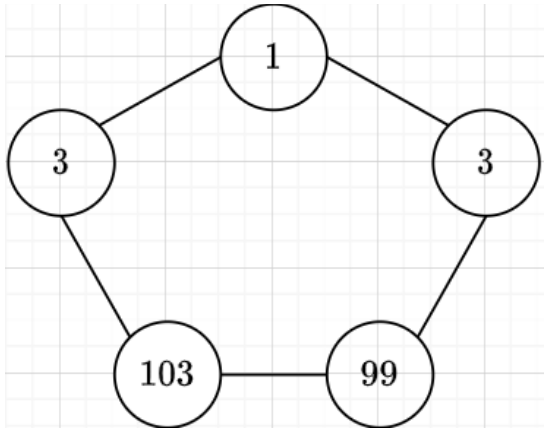


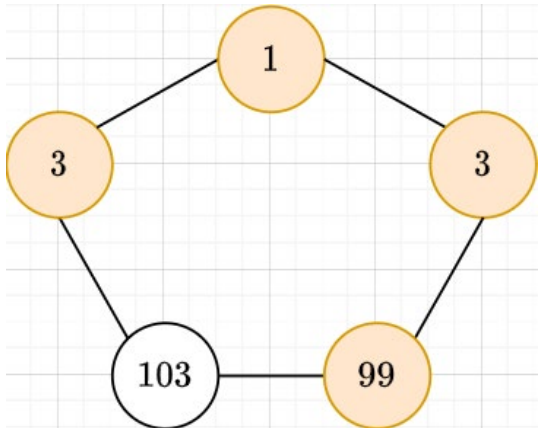
Pricing #2
$w = 2$

As for LP-based method, the solution is $[0.5,0.5,0.5,0.5]^{\mathsf{T}}$. Thus, $w = 4$.

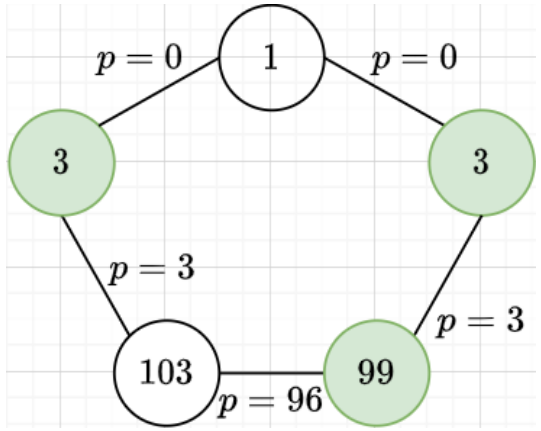
Task 11-2

Consider all 5 points with 5 edges in a graph.





Greedy Worst
$w = 106$

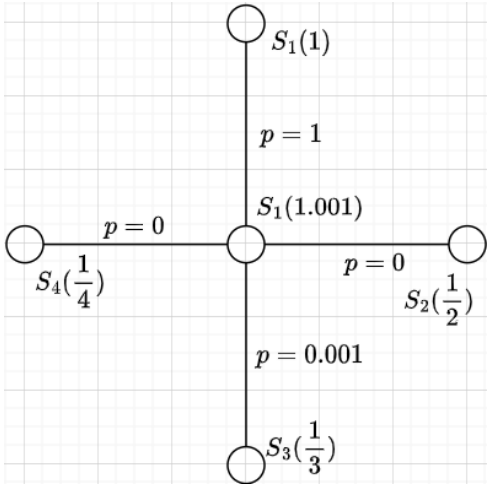


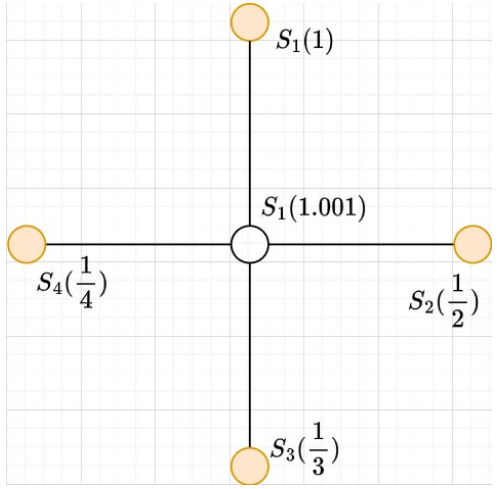
Pricing Worst
$w = 105$

As for LP-based method, the solution is $[0.5,0.5,0.5,0.5,0.5]^{\mathsf{T}}$. Thus, $w = 209$.

Task 11-3

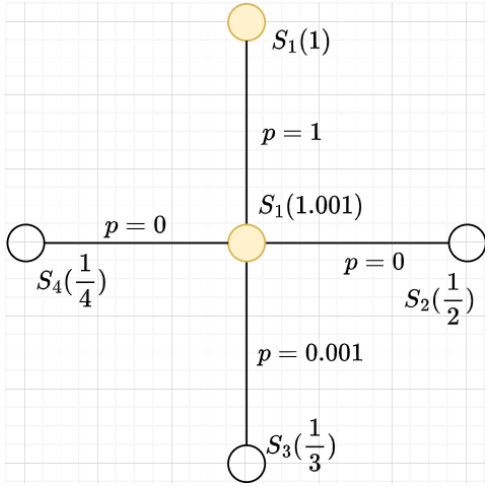
Consider all 5 points with 4 edges in a graph.





Greedy

$w = 2.0833$



Pricing Worst

$w = 2.001$

As for LP-based method, the solution is $[1 - t, t, t, t, t]^{\top}$. Thus,

$w = 2.0833t + 1.001(1 - t), t \in \{0,1\}$

, where w could reach 1.001.