Aalto University

Distributed Algorithms 2021

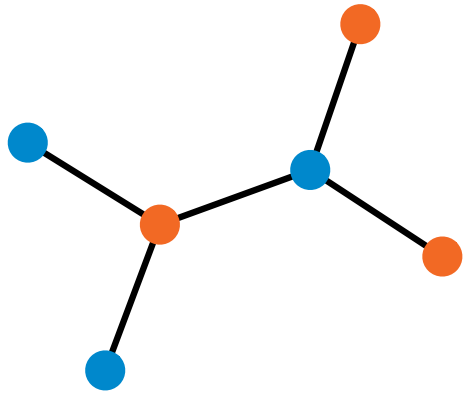
3 Port-numbering model

Port-numbered network
$N = (V, P, p)$

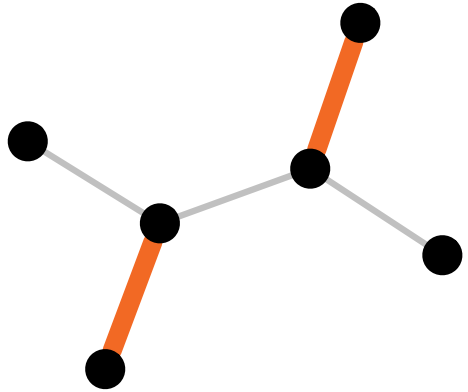
Distributed algorithm
A = (init, send, receive)

Output of algorithm A in network N

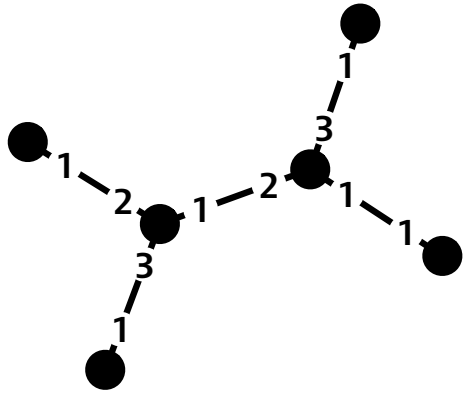
Bipartite maximal matching



Input:
proper 2-coloring



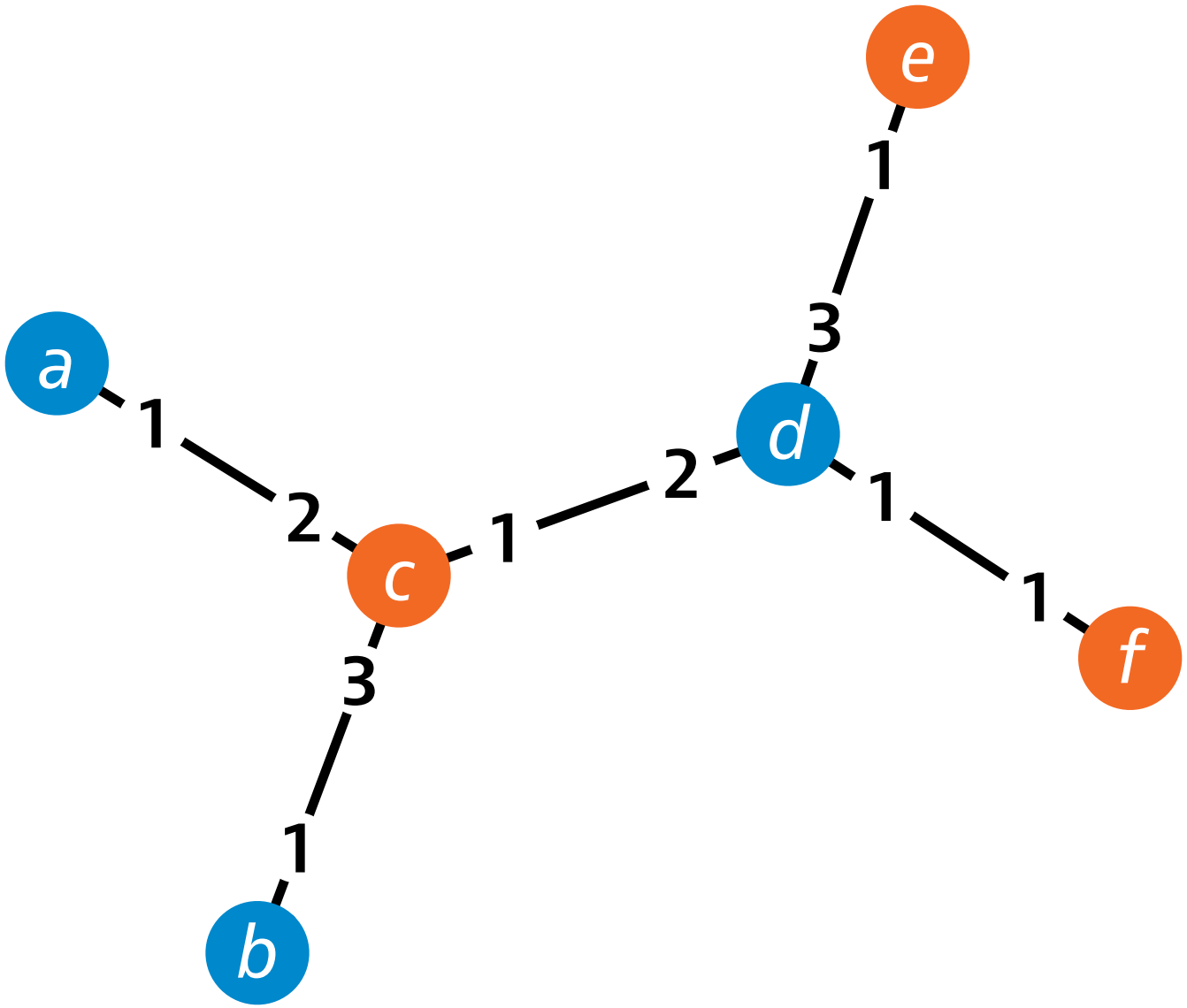
Output:
maximal matching



Model of computing:
PN model

Algorithm

- ***Orange*** nodes send ***proposals*** to their neighbors, one by one
  - order by port numbers
- ***Blue*** nodes ***accept*** the first proposal they get, reject everything else
  - break ties by port numbers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1
3
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1
1
c
1
f
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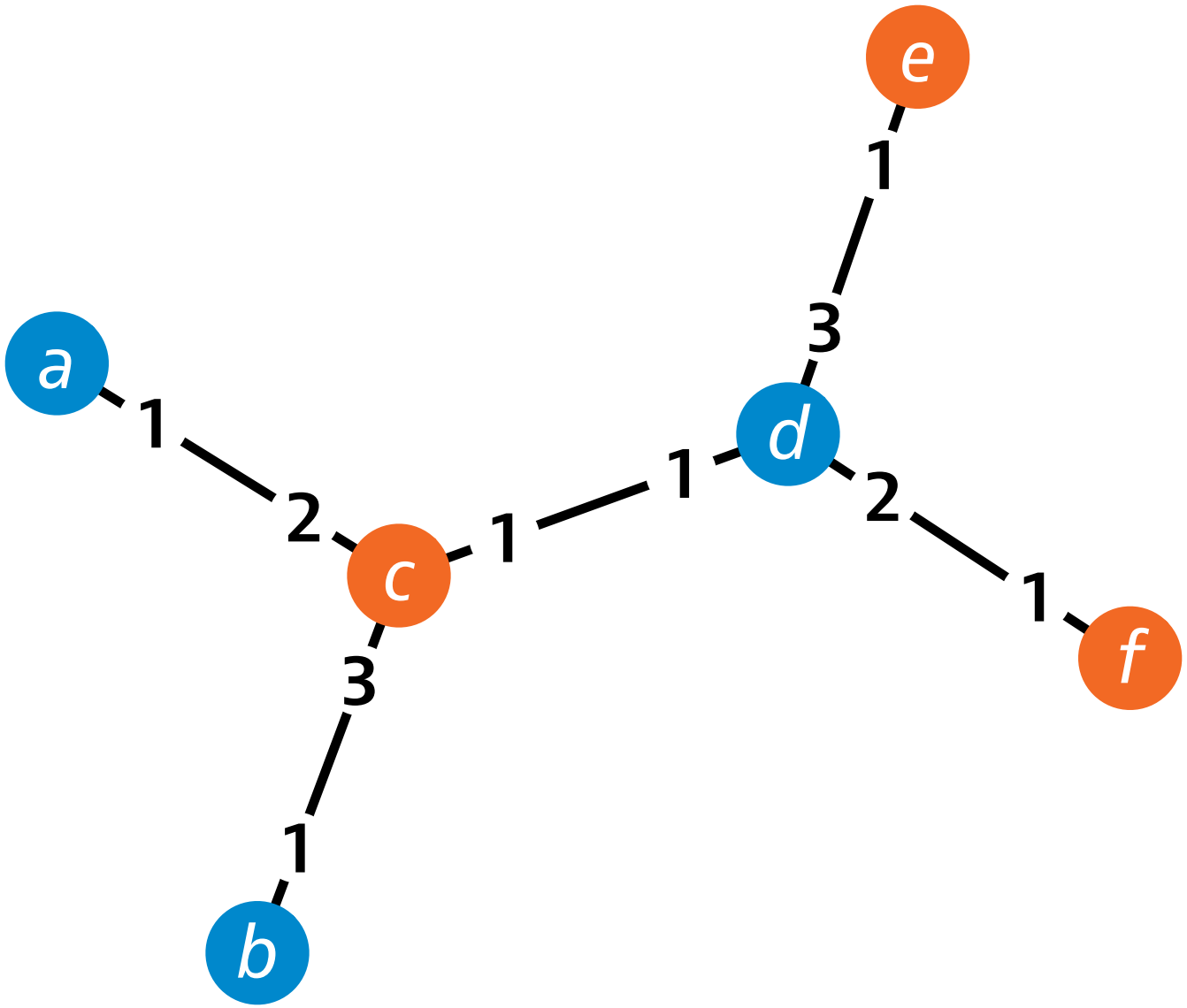
1
b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a
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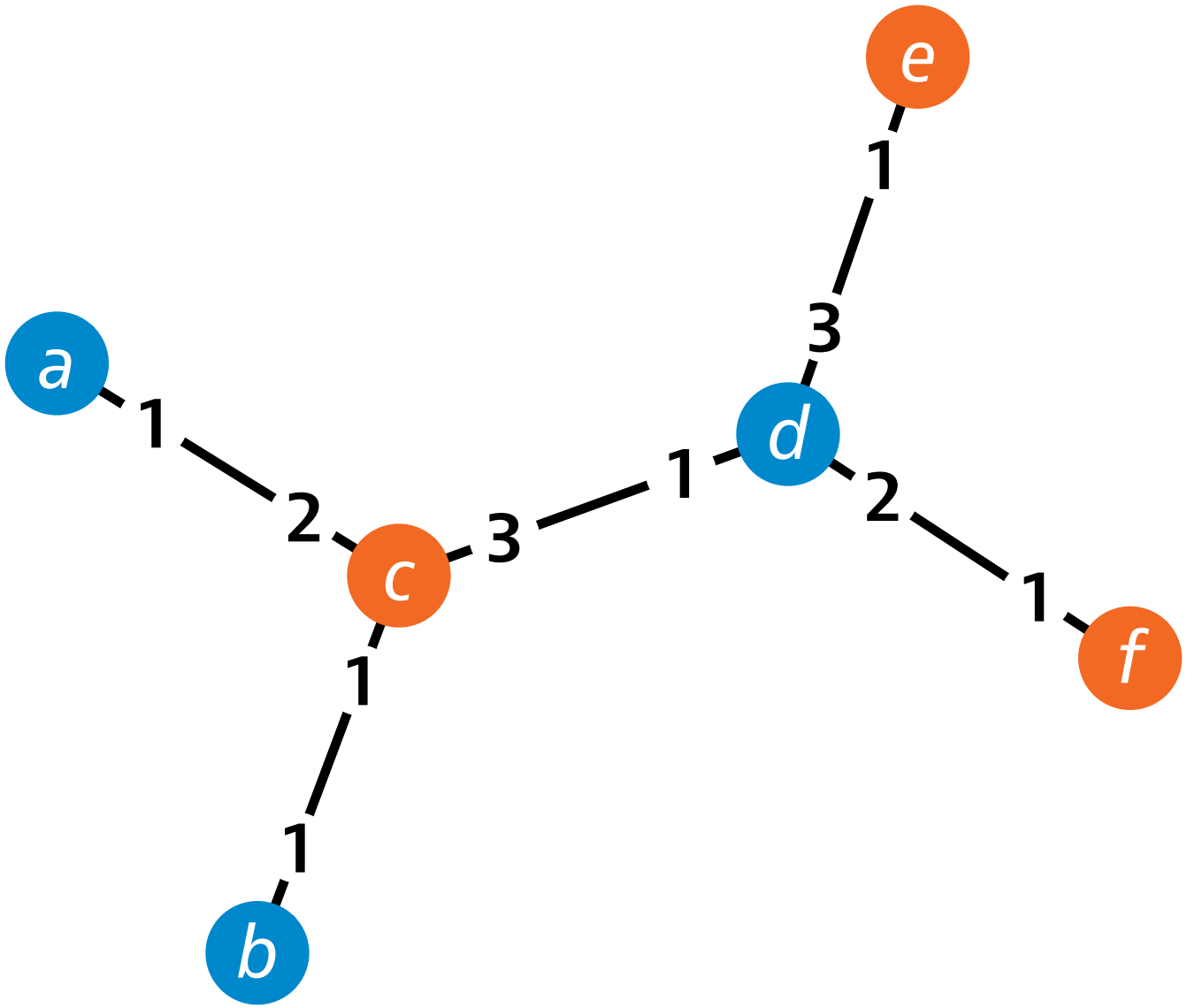
d
1
2
2
c
1
1
3
f
1
b


e
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a
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d
1
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2
c
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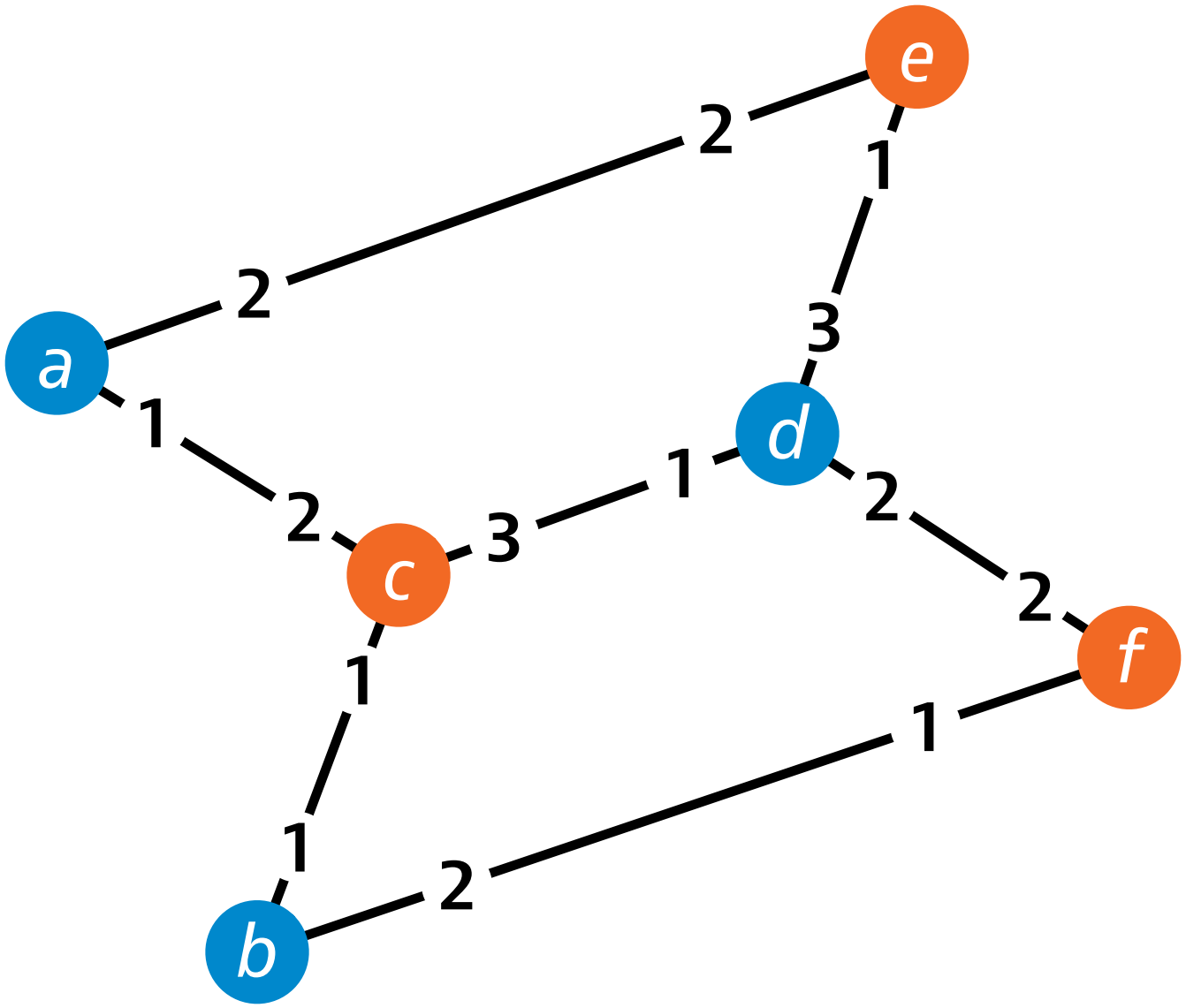
1
f
1
b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c
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f
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1
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2
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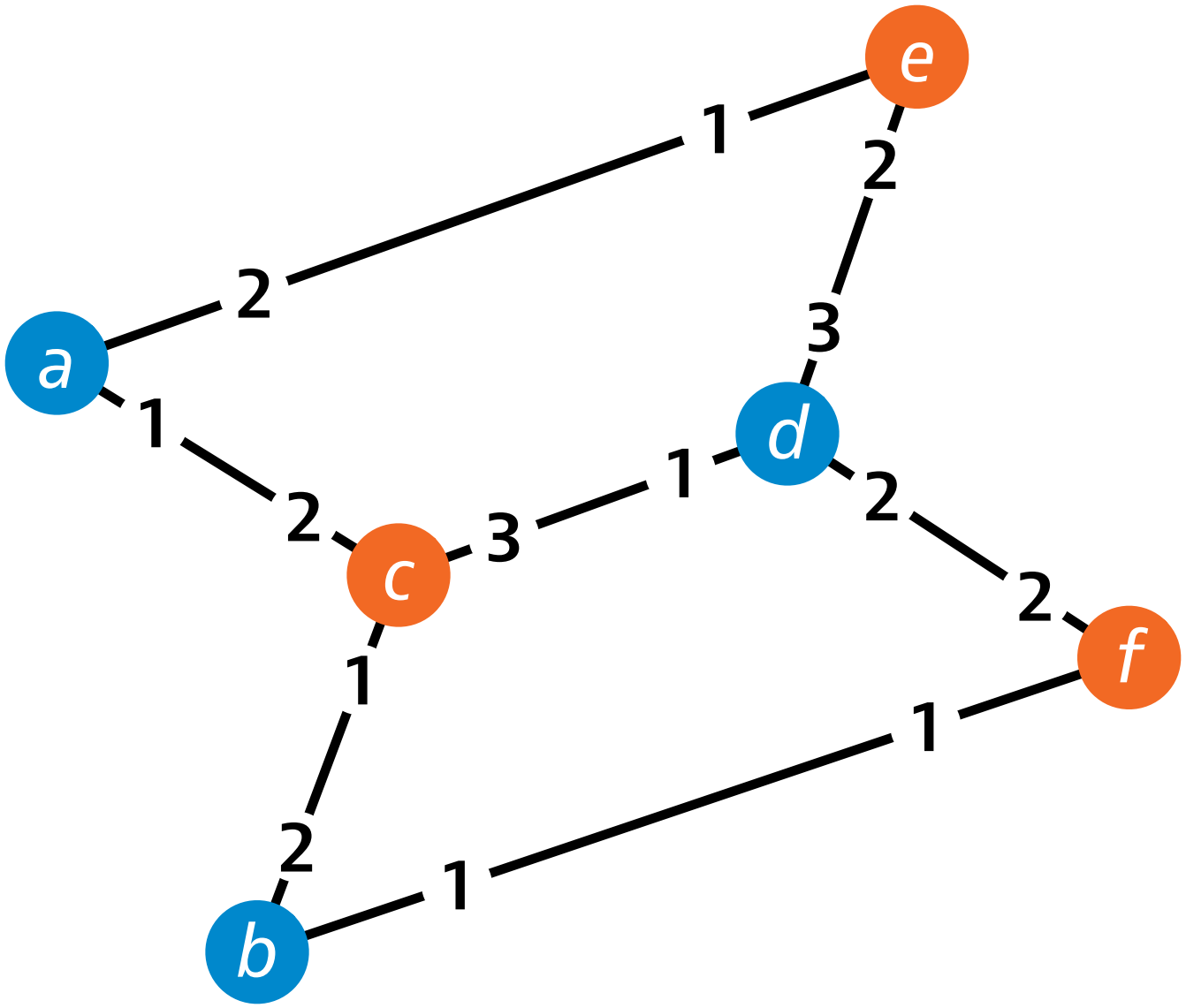
e
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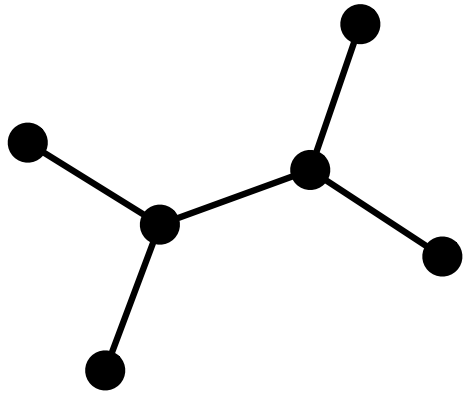
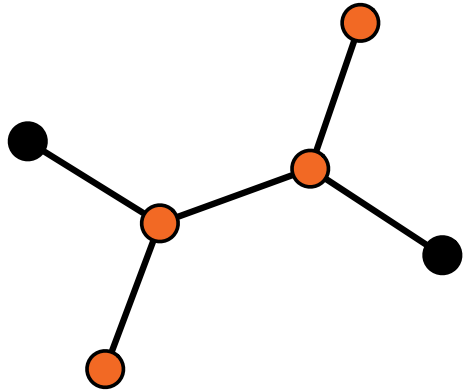
1
2
1
b

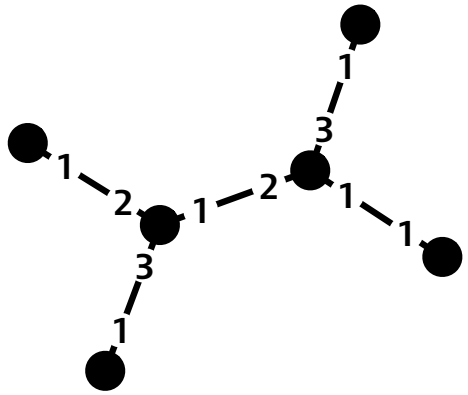
Vertex cover



Input:
nothing



Output: 3-approximation of minimum vertex cover

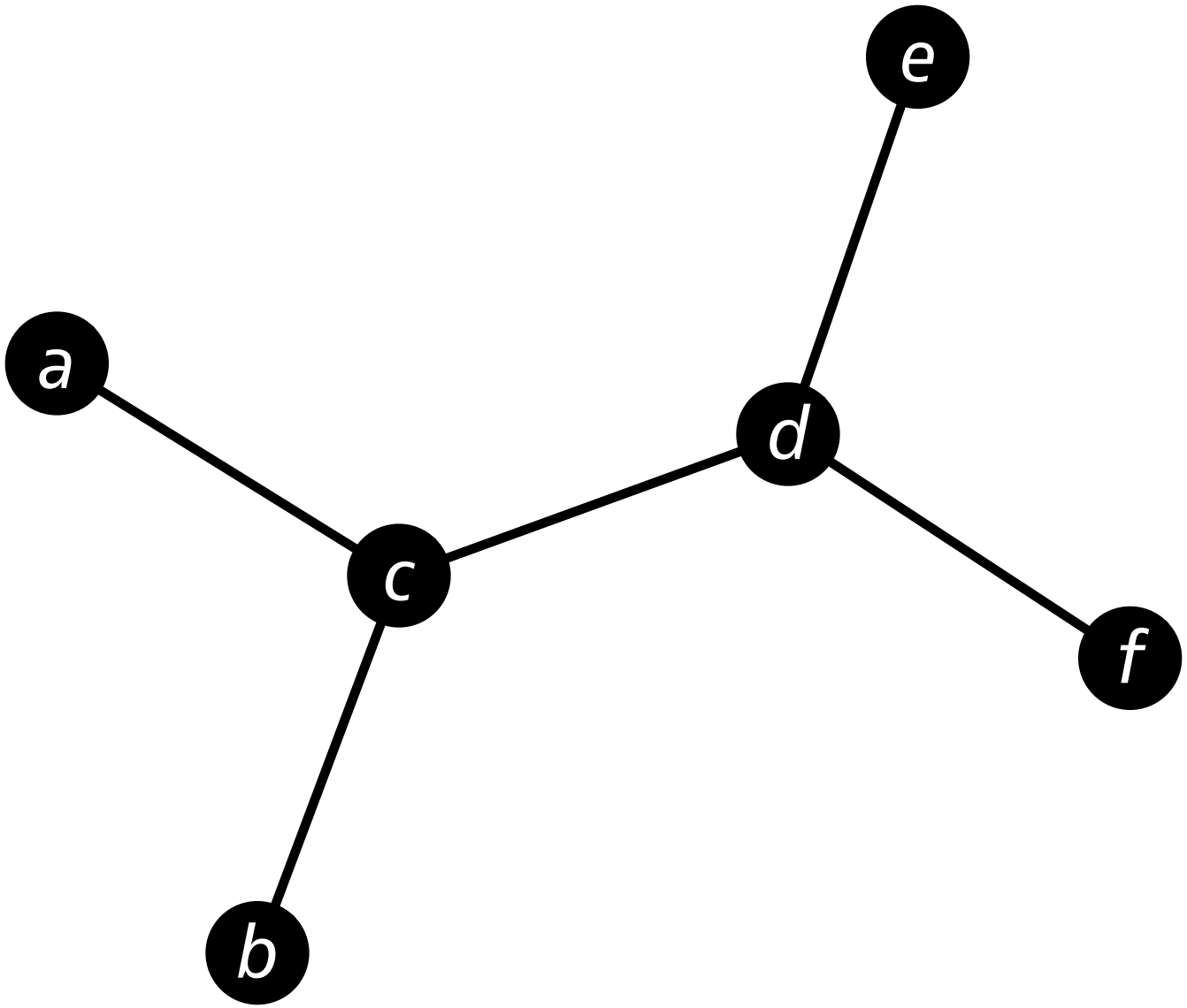


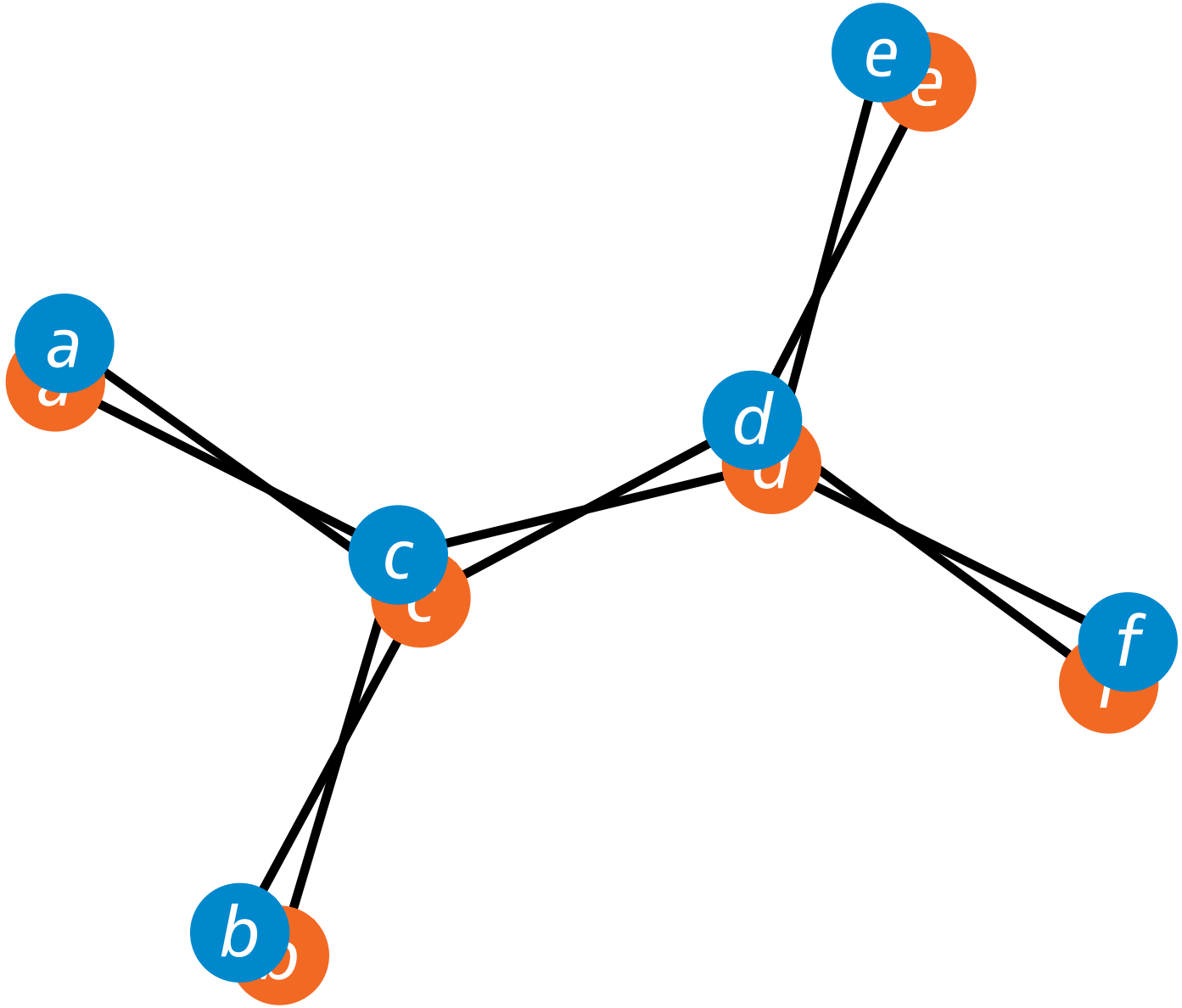
Model of computing:
PN model

Algorithm

- Construct bipartite double cover G'
  - one node in G: two virtual copies in G'
  - one edge in G: two virtual copies in G'
- Find a maximal matching M' in G'
- Take all original nodes of G whose virtual copies are matched in M'

Graph *G*

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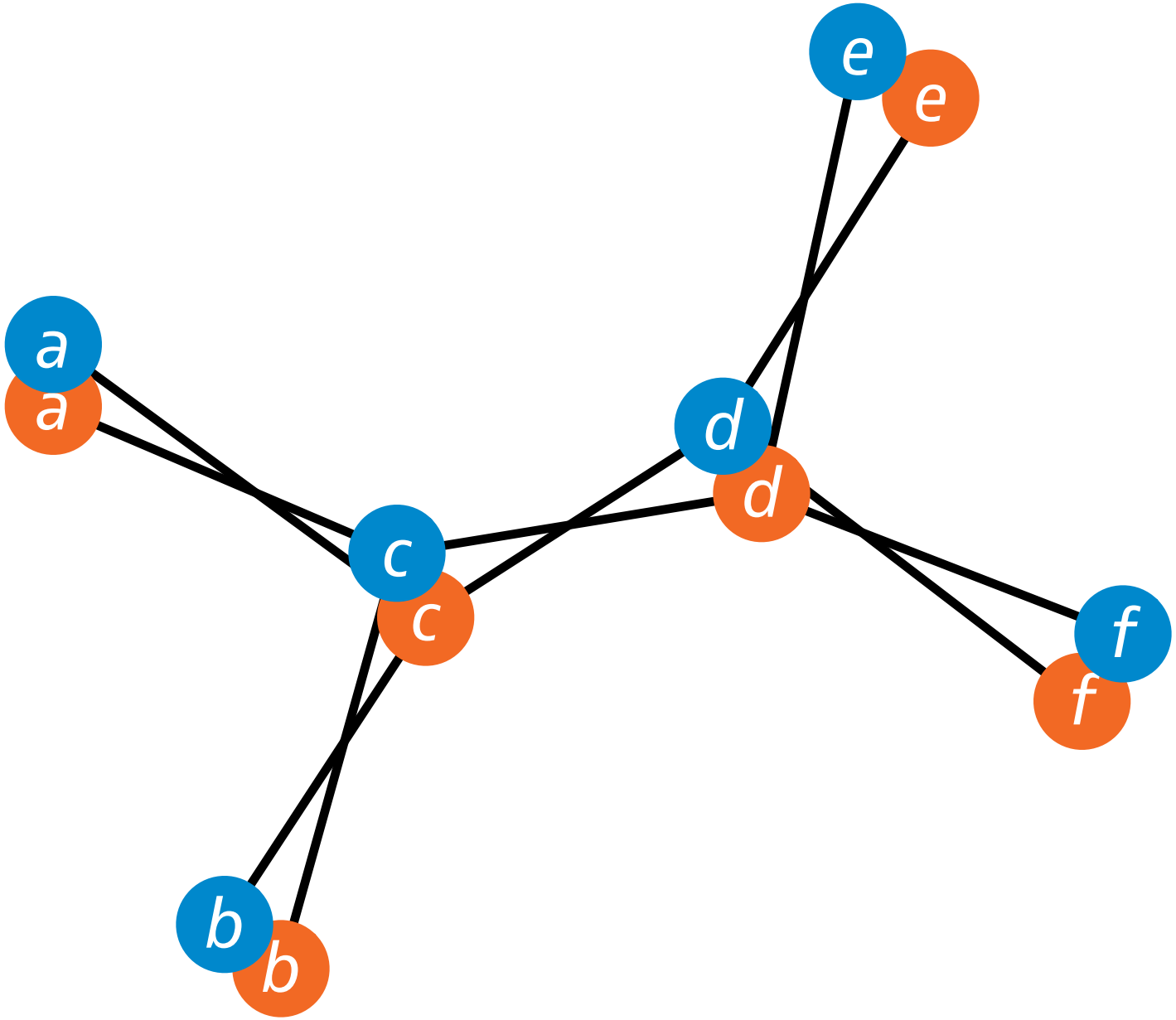
e
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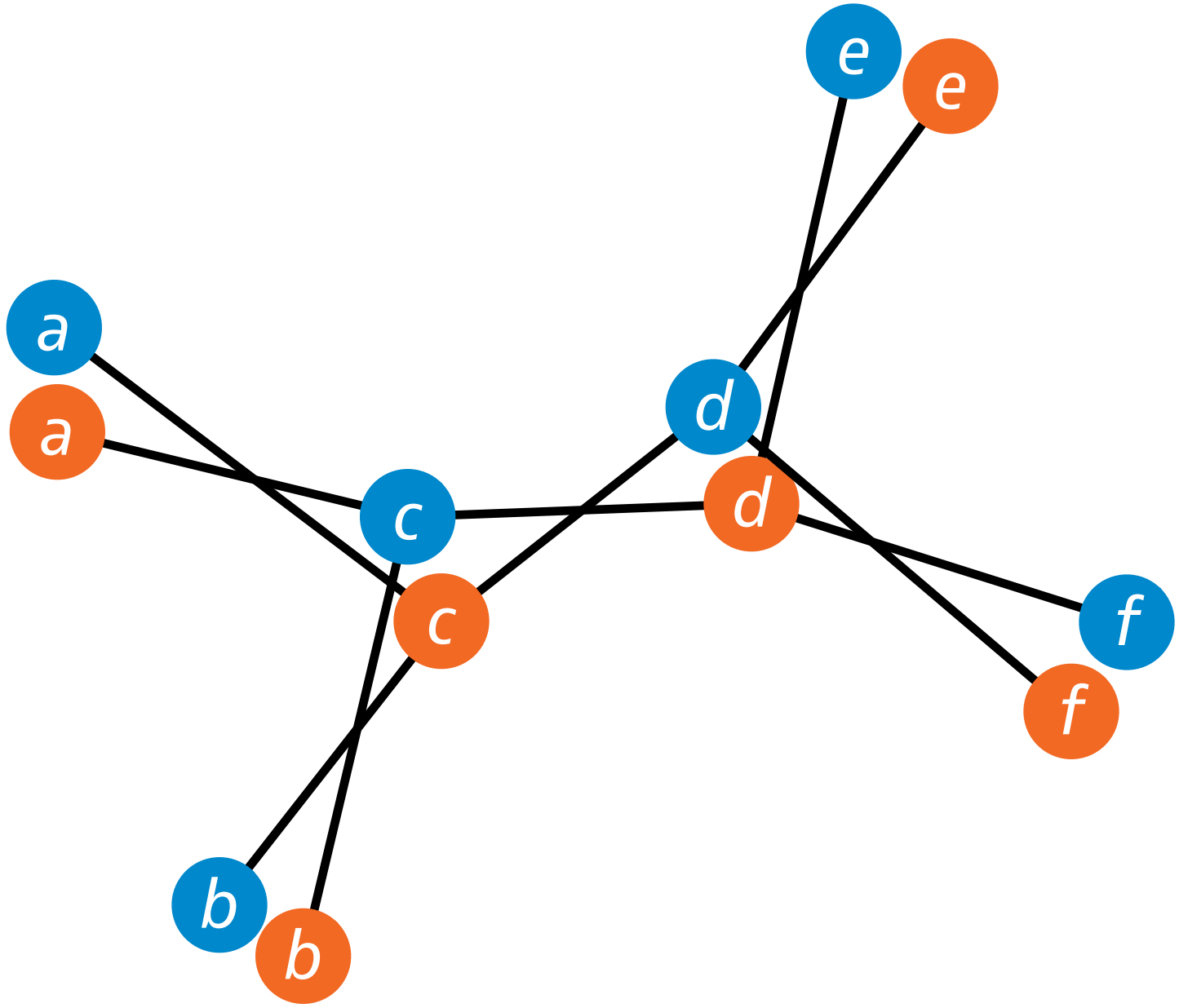
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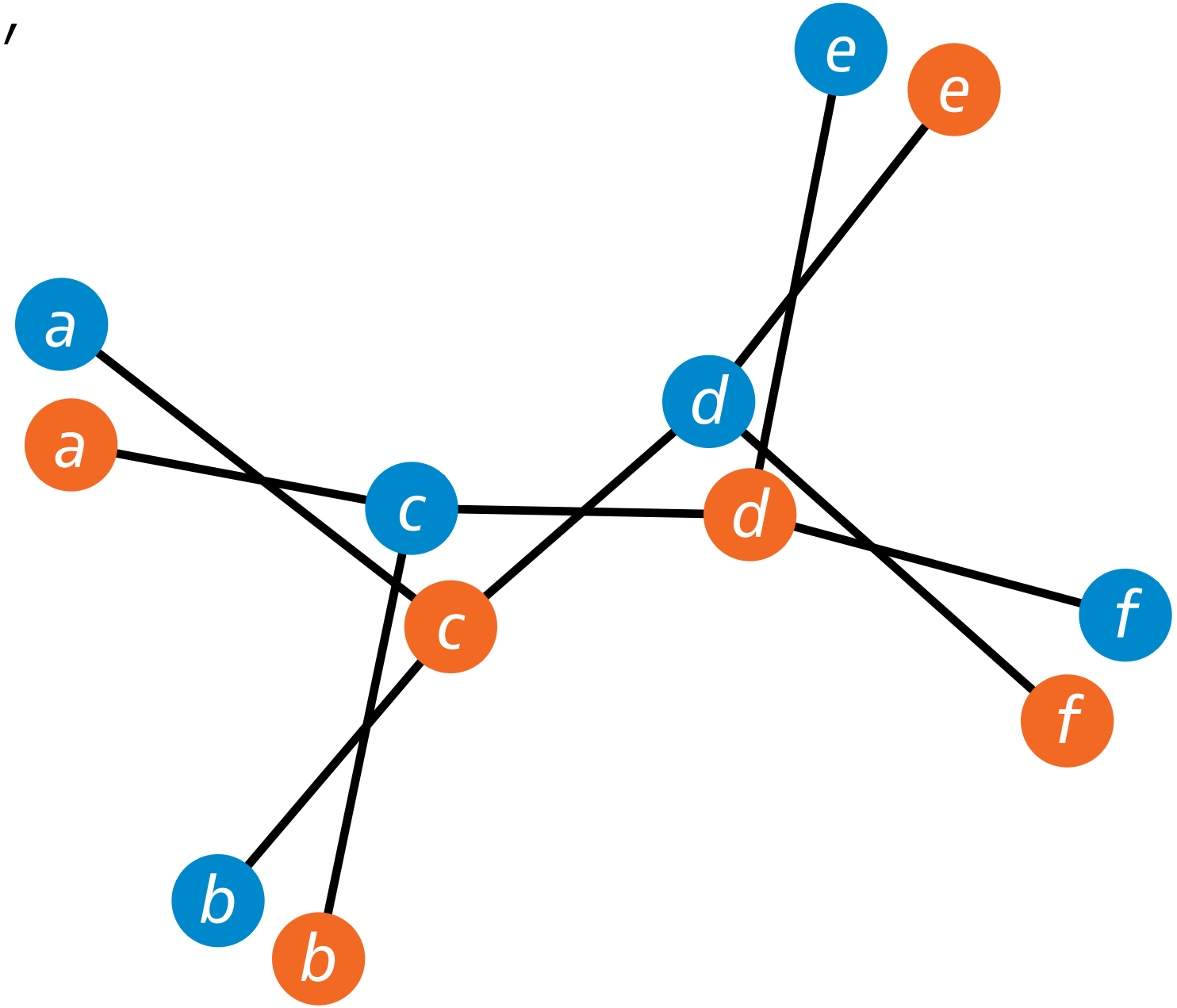
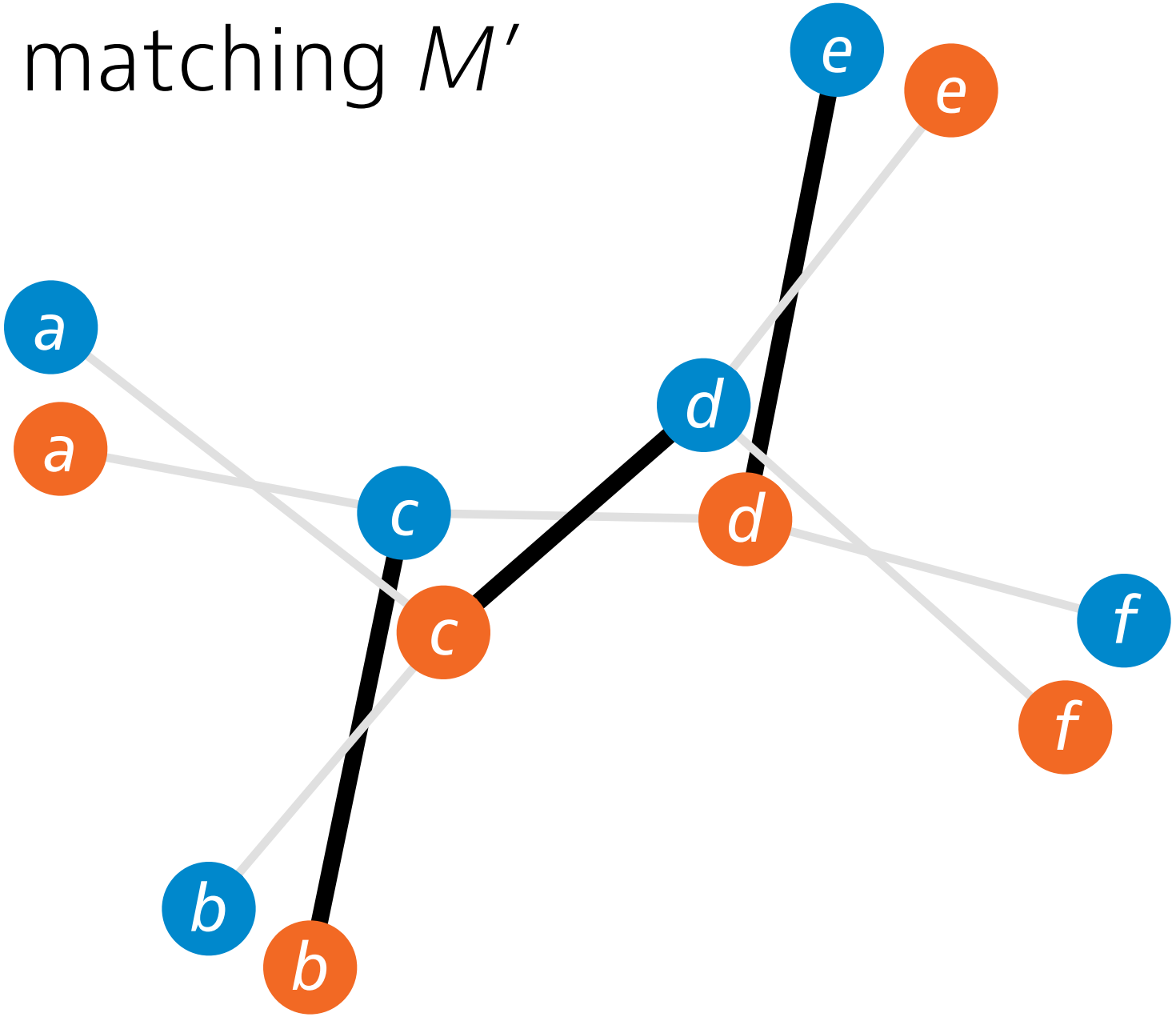
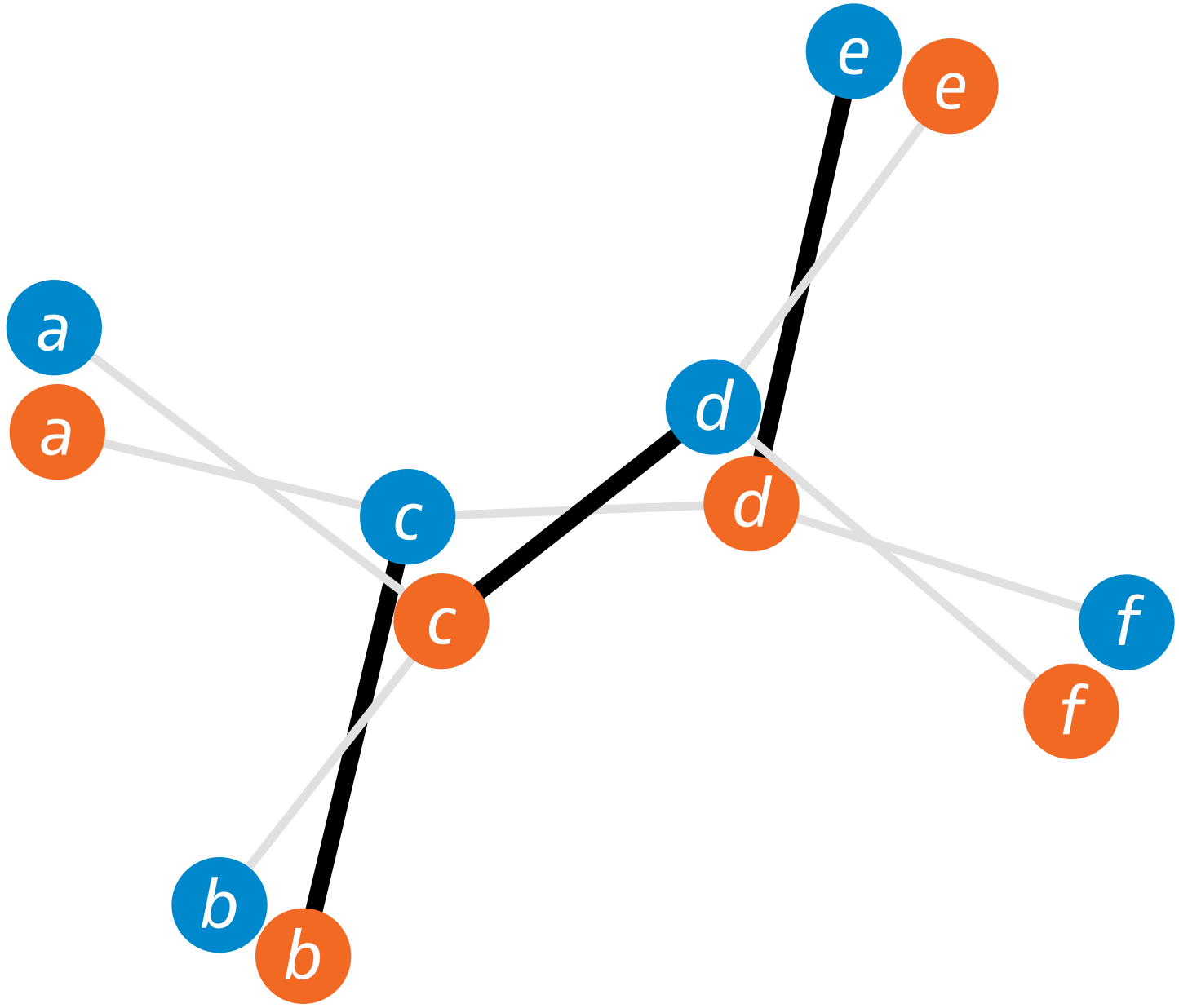
Graph G'



Maximal matching *M'*

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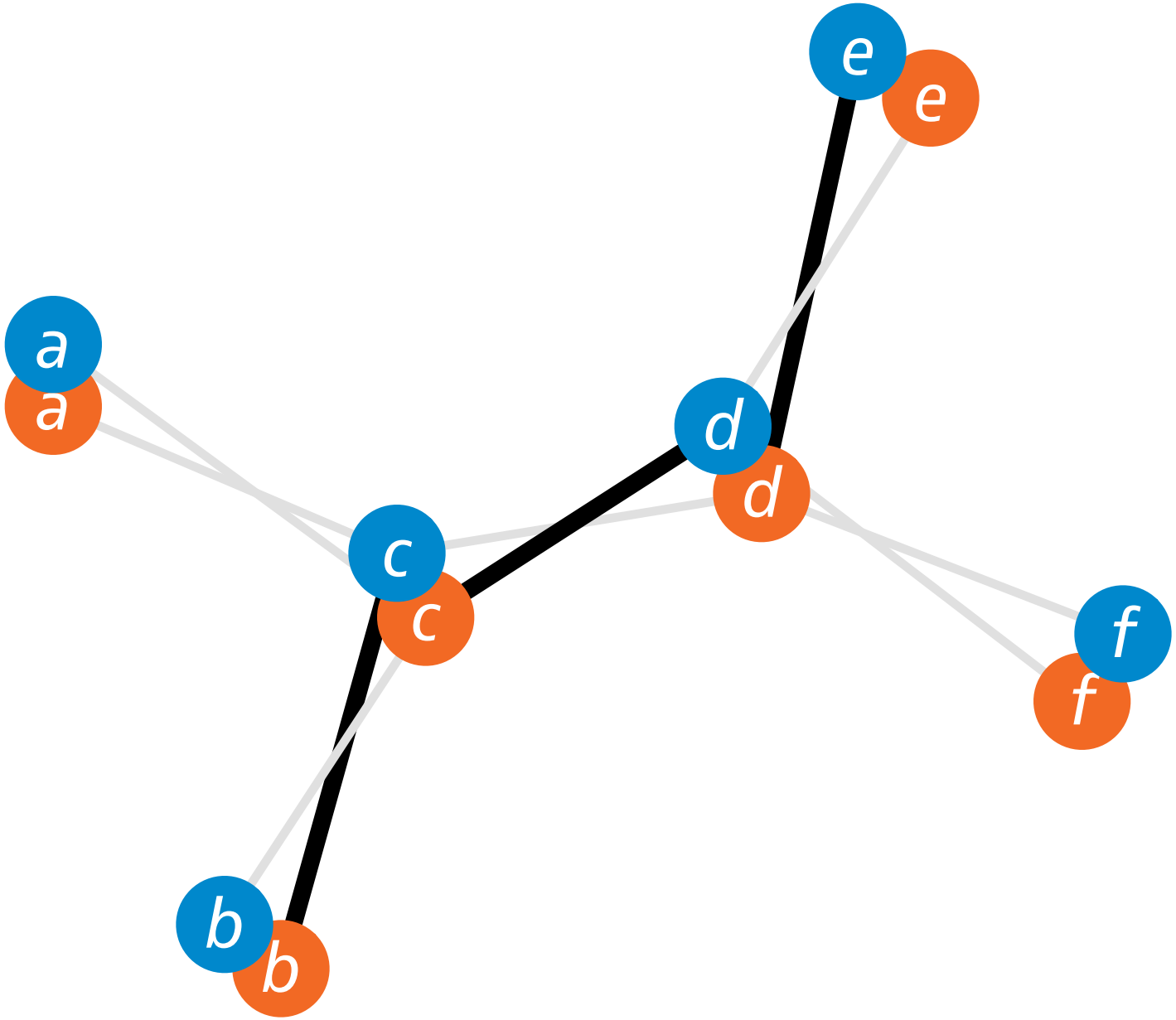
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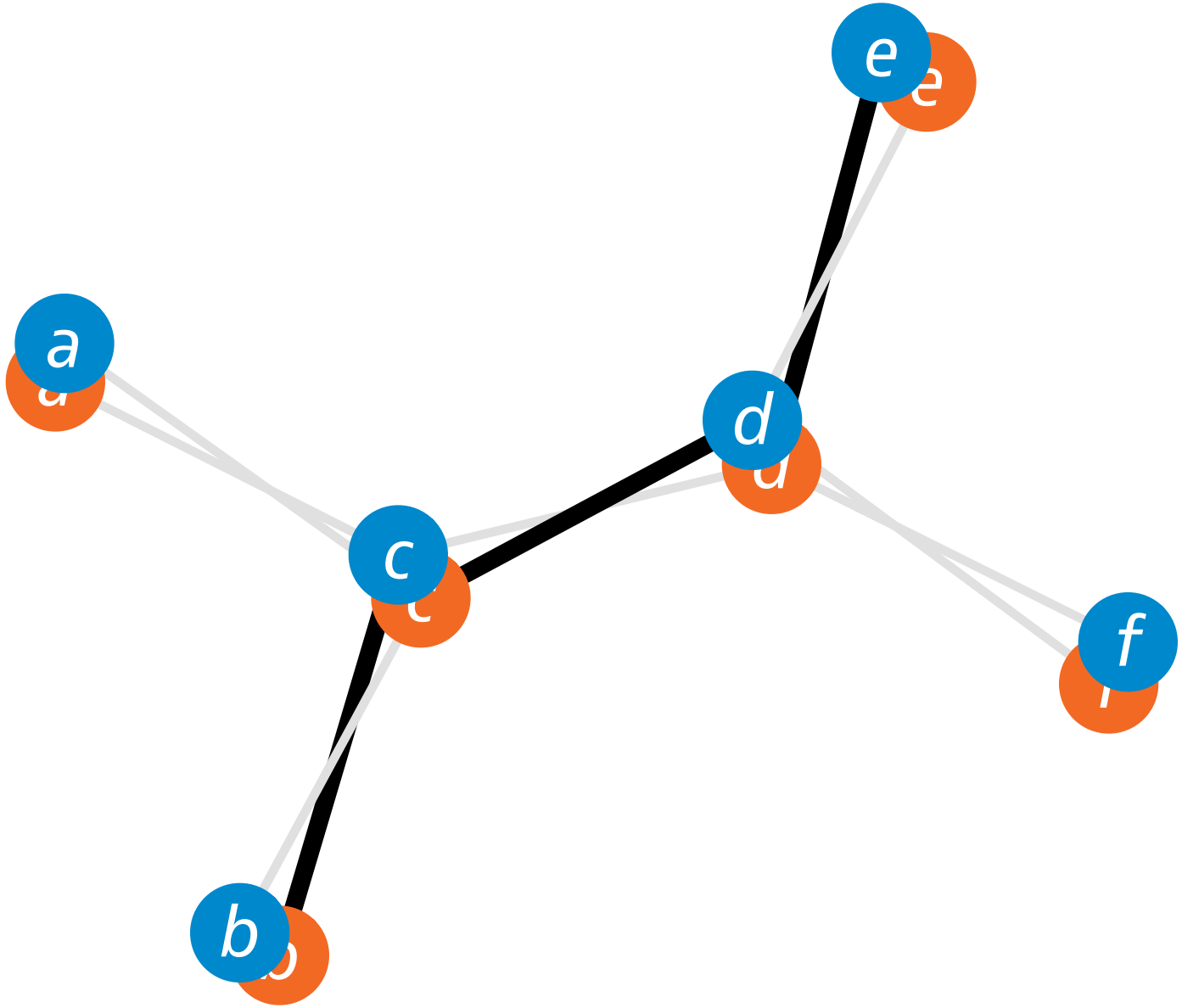
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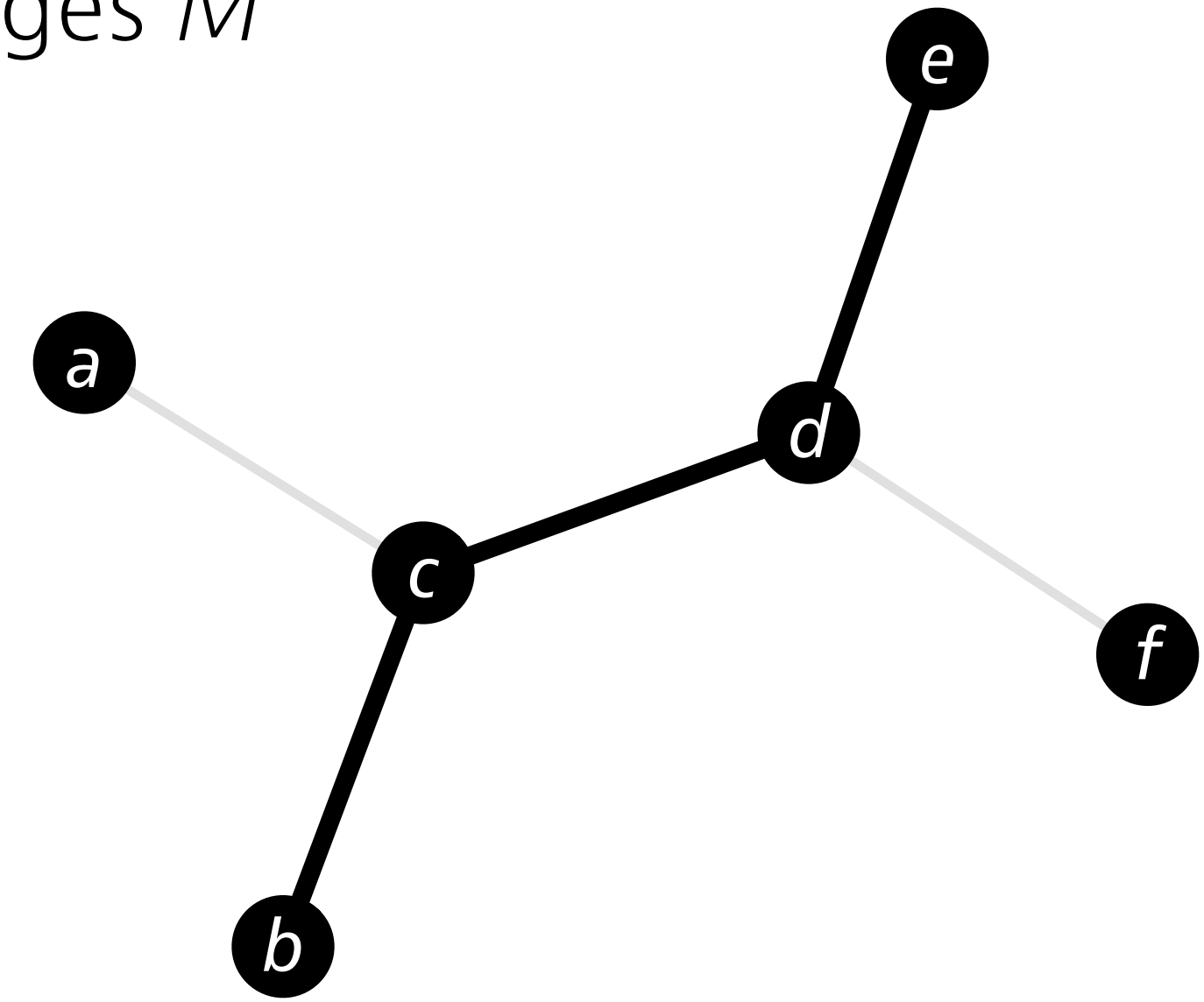
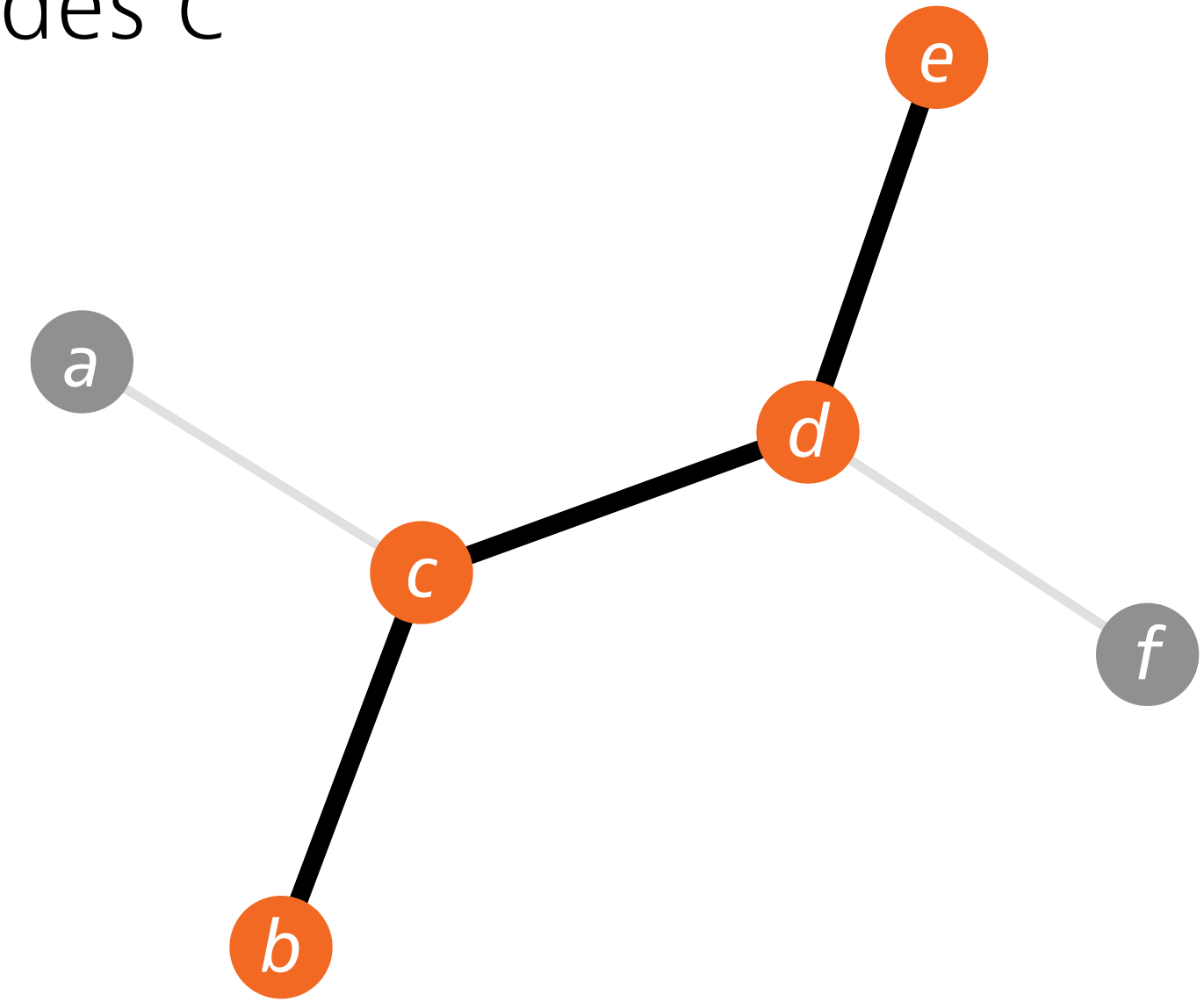
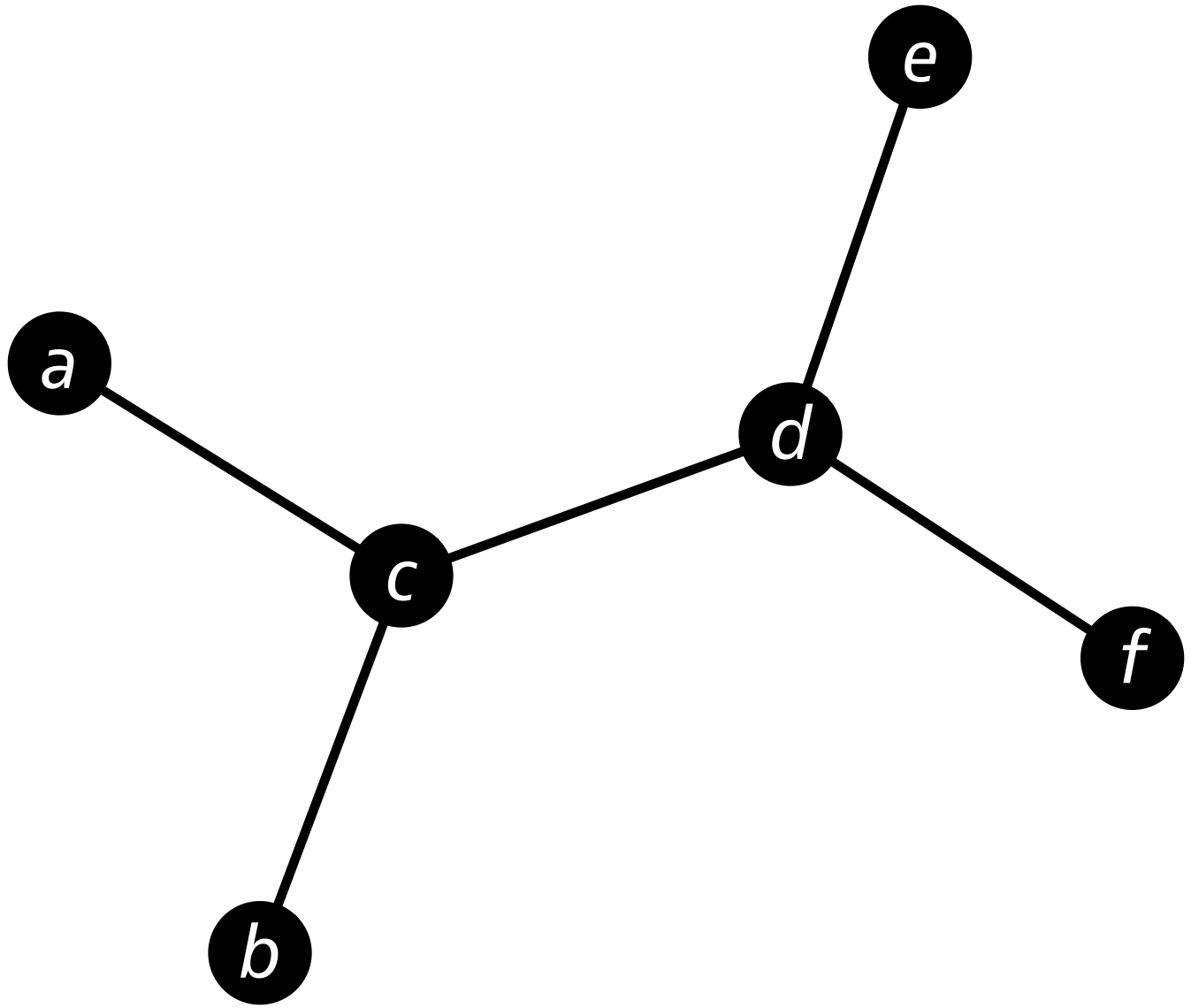
Set of edges *M*



Set of nodes *C*

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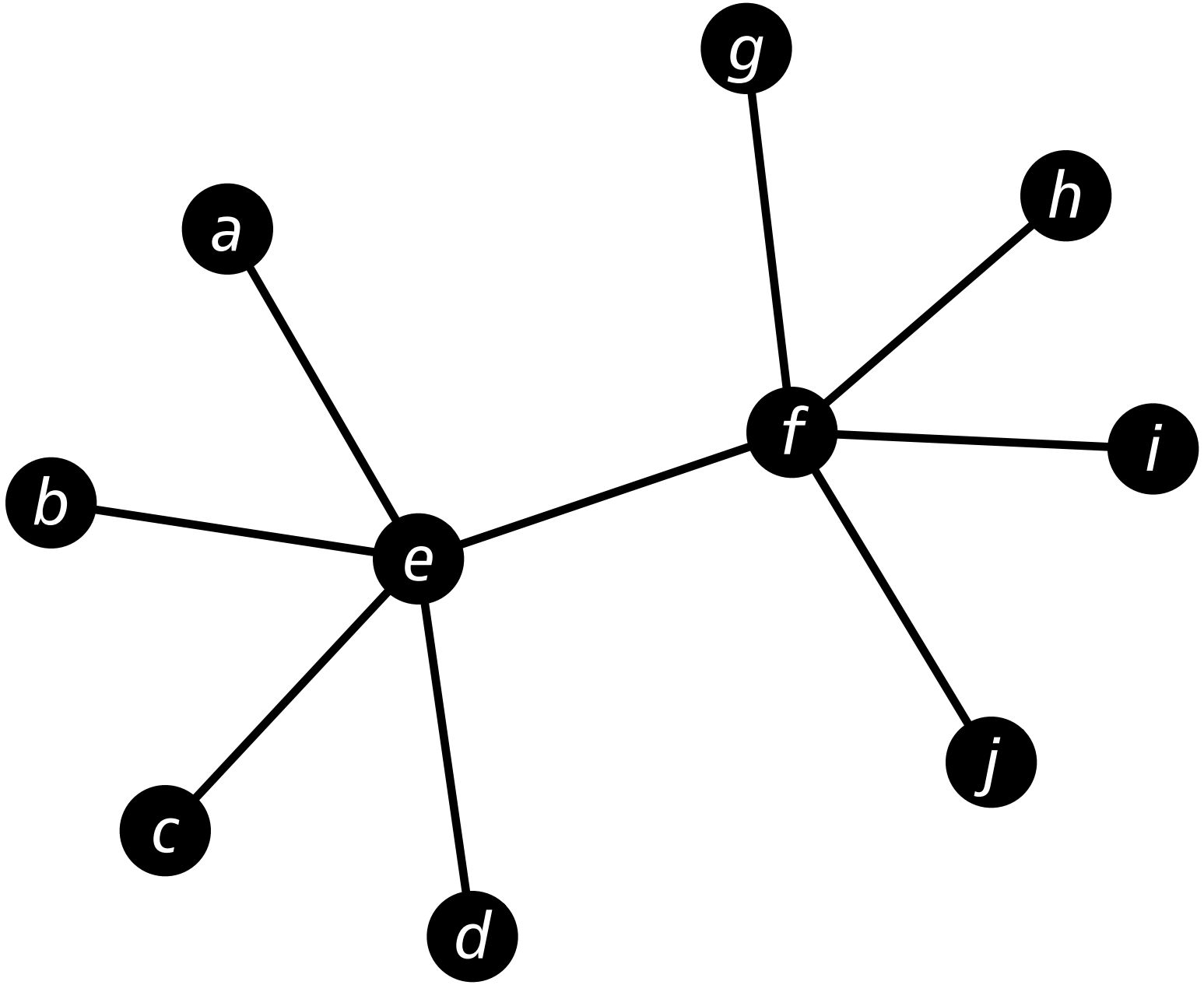
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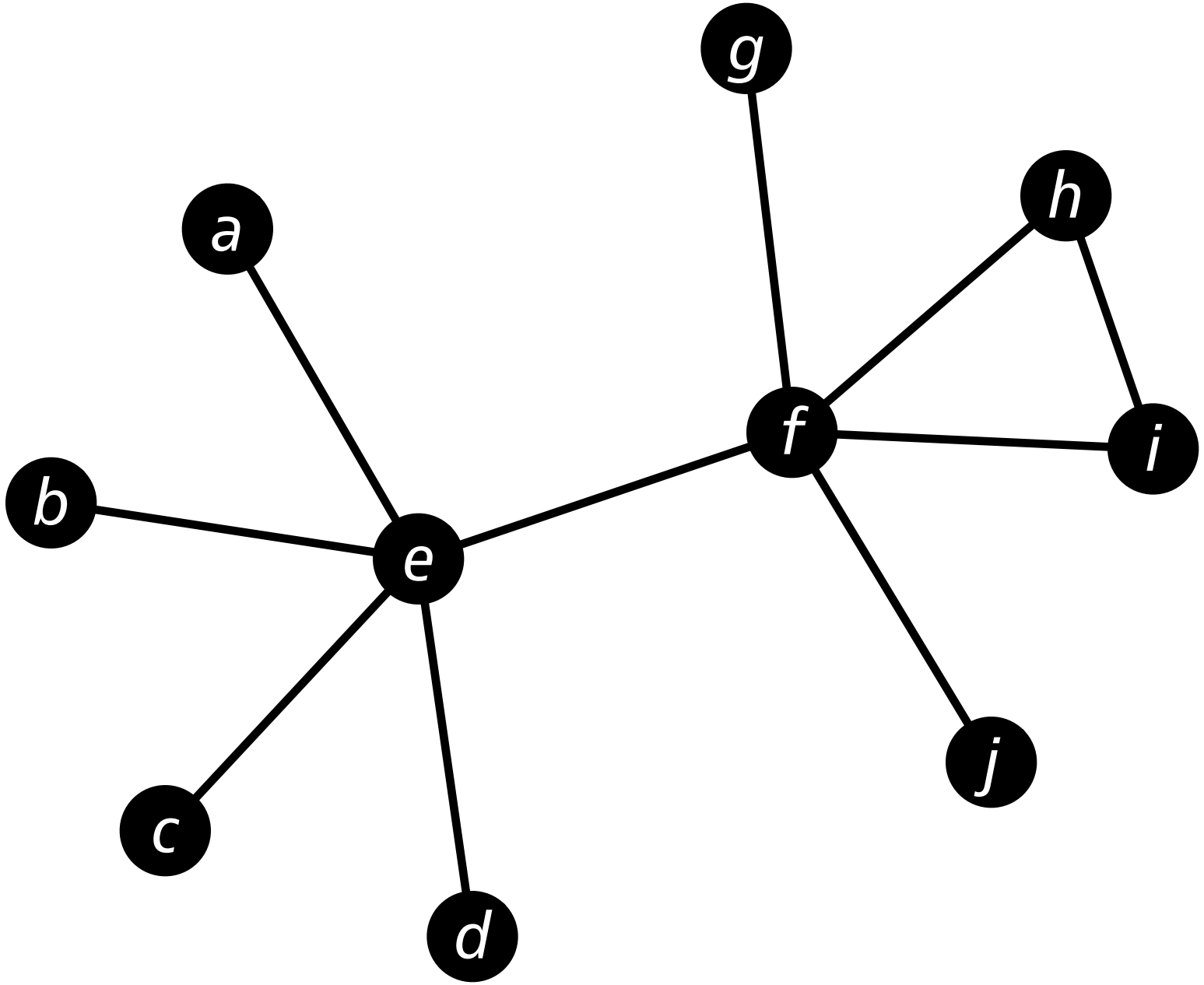
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