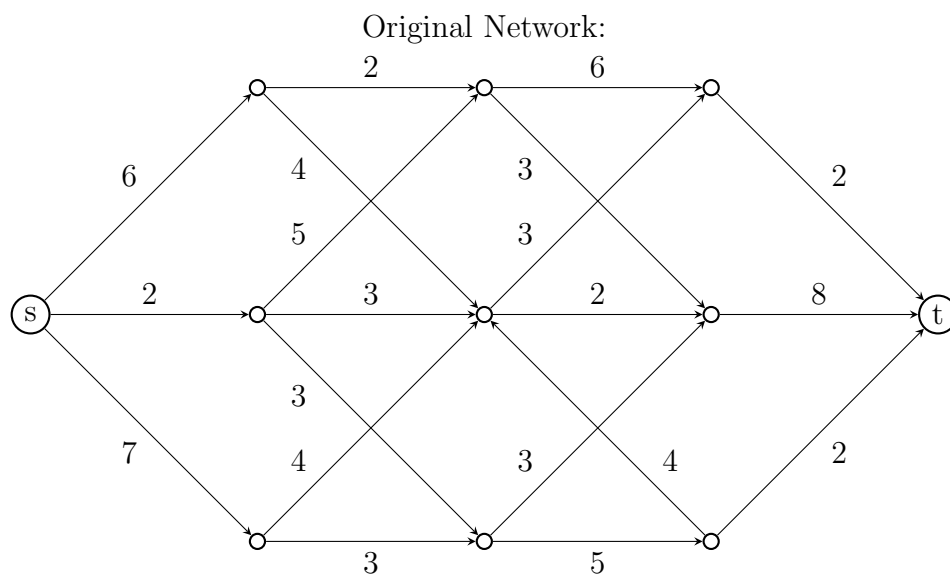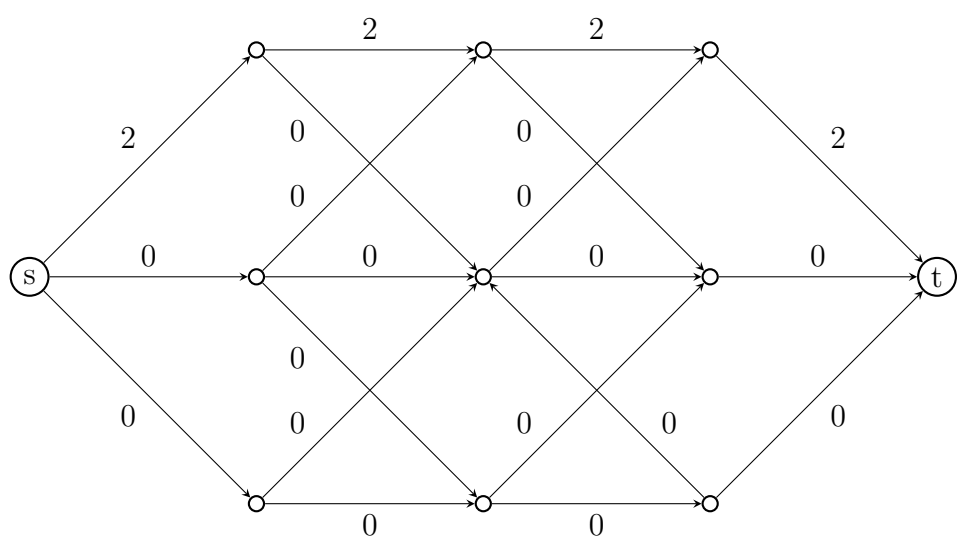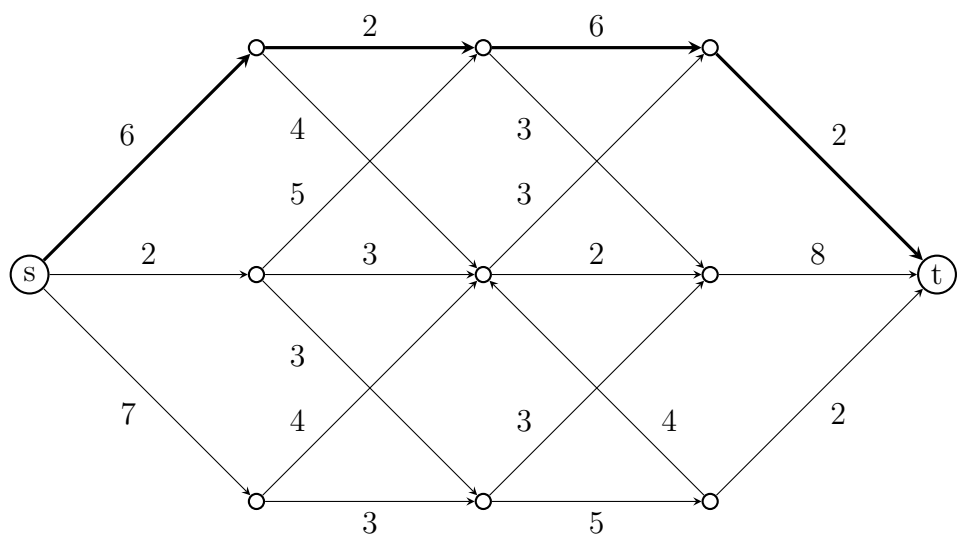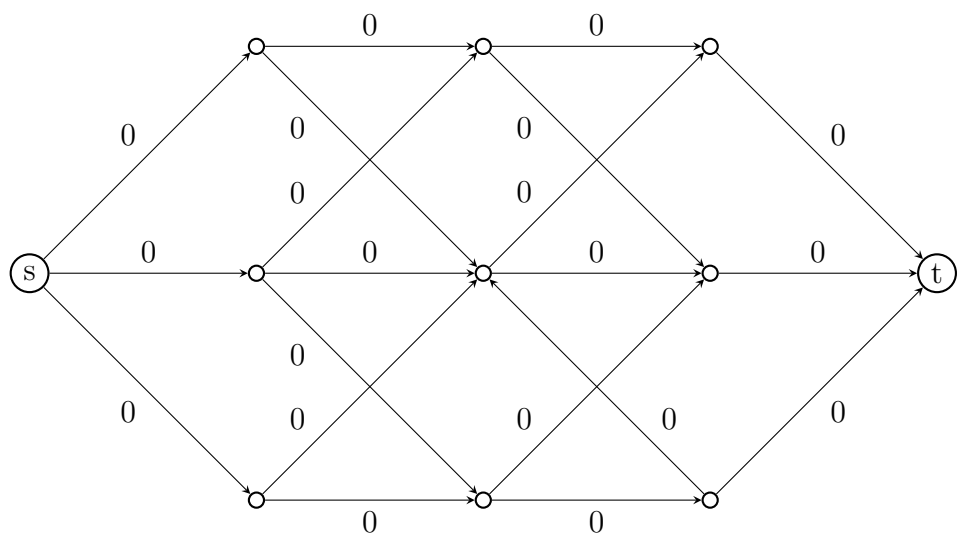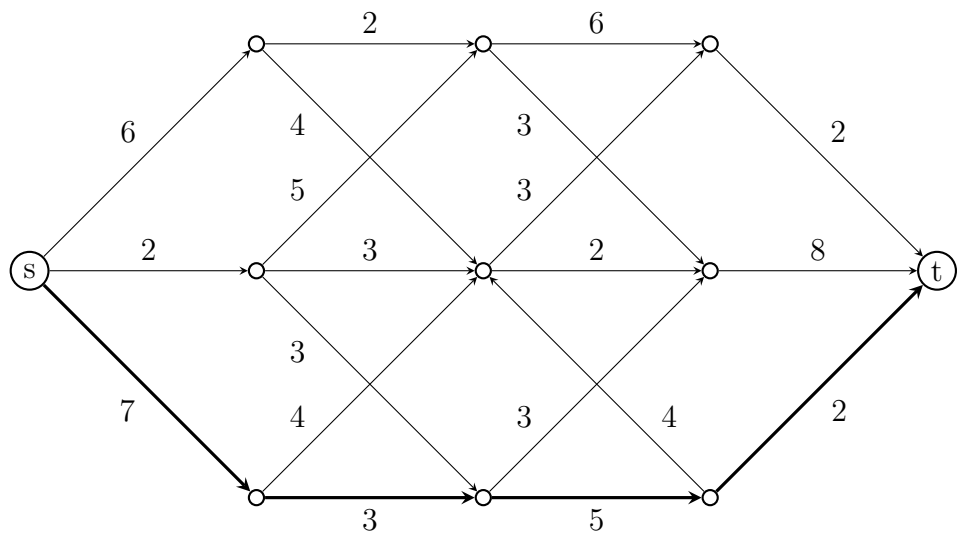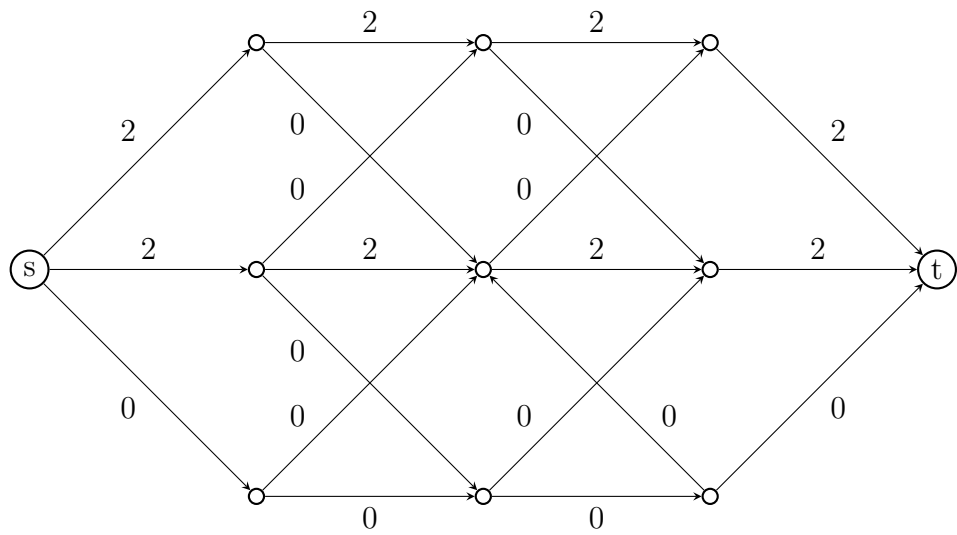# Graph Algorithms and Complexity Theory - Coursework 1

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Semester 1 Session 2019–2020

We compute a maximum flow in this network and find a minimum cut as follows. The left column shows the actual flow and the right column shows the residual network with residual capacities and an augmenting path indicated by bold edges.

Original Network:

Top graph

0 0
0 0 0 0
s 0 0 0 0 0 t
0 0
0 0 0 0
0 0

Middle graph

2 6
6 4 3 2
s 2 5 3 3 8 t
7 3 2
3 4 3 5 4 2
3 5

Bottom graph

2 2
2 0 0 2
s 0 0 0 0 0 t
0 0 0 0
0 0 0
0 0

Top graph:

s, t

6, 2, 2, 6, 2
4, 3
5, 3
2, 3, 2, 8
3, 3, 4
7, 4
3, 5, 2

Middle graph:

s, t

2, 2, 2, 2
0, 0
0, 0
2, 2, 2, 2
0, 0, 0
0, 0, 0, 0

Bottom graph:

s, t

6, 2, 6, 2
4, 3
5, 3
2, 3, 2, 8
3, 3, 4, 2
7
3, 5
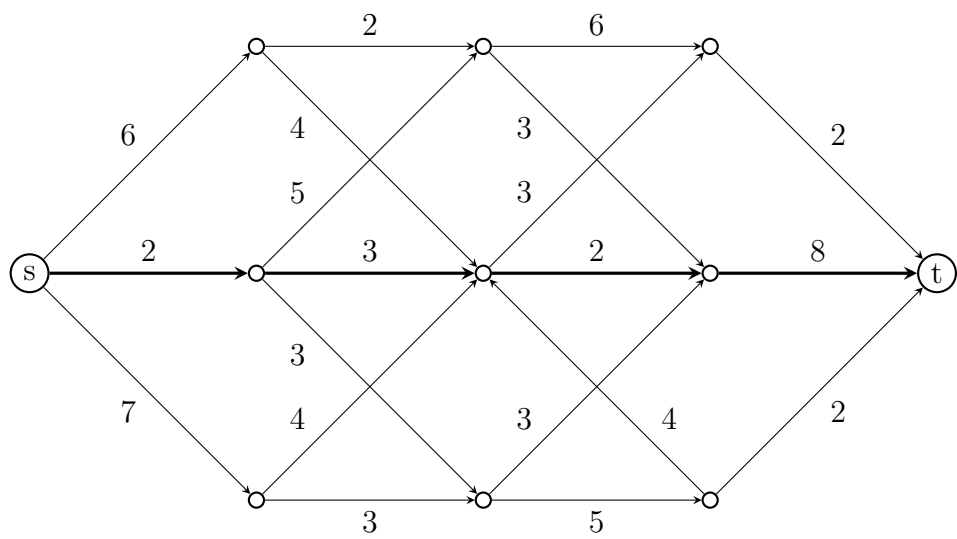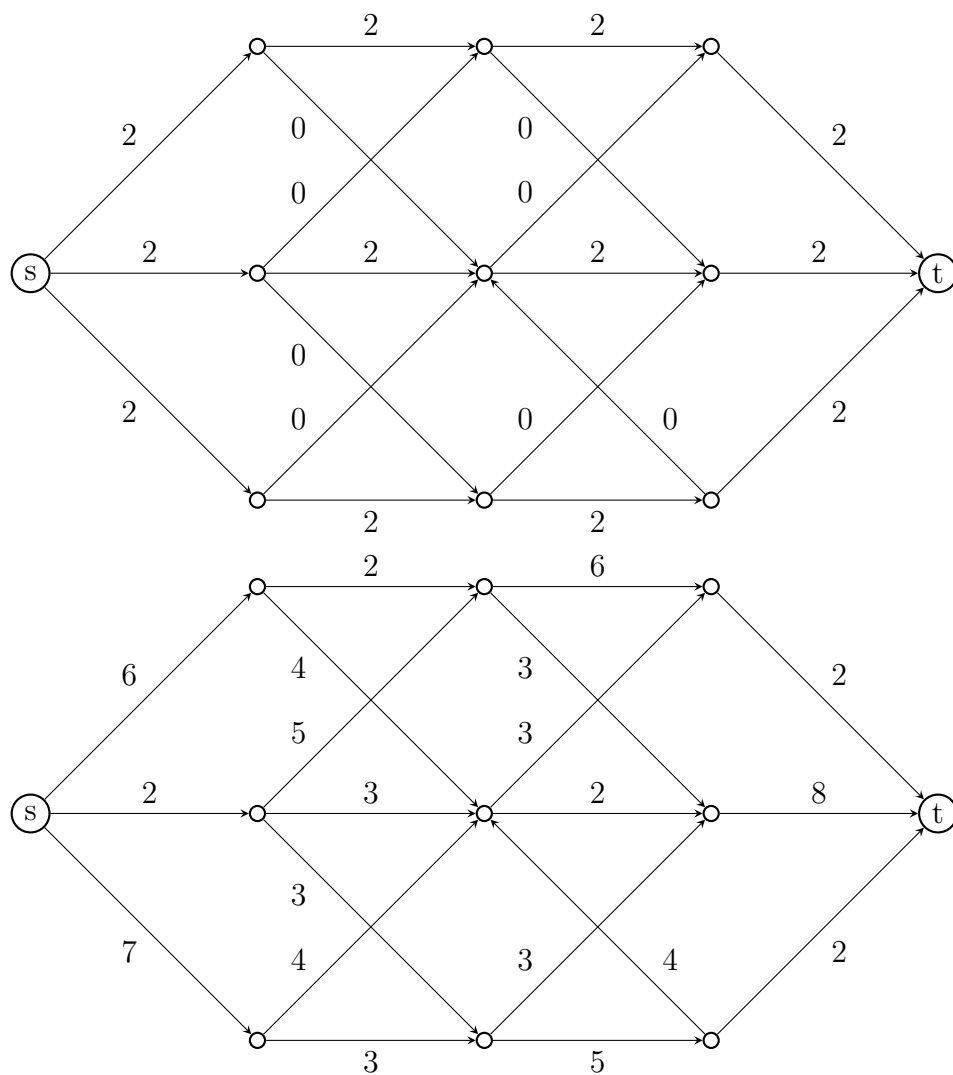
The last flow has value 12. A cut (A, B) of this capacity is defined by square white vertices in A and round black vertices in B. Therefore the flow is maximum and the cut (A, B) is a minimum cut. The edges across the cut (A, B) are indicated by dashed lines.