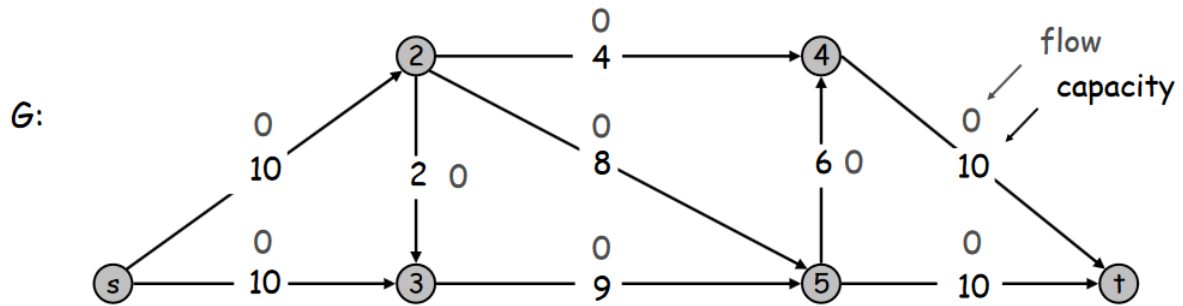


# Practice 4.1: Flow

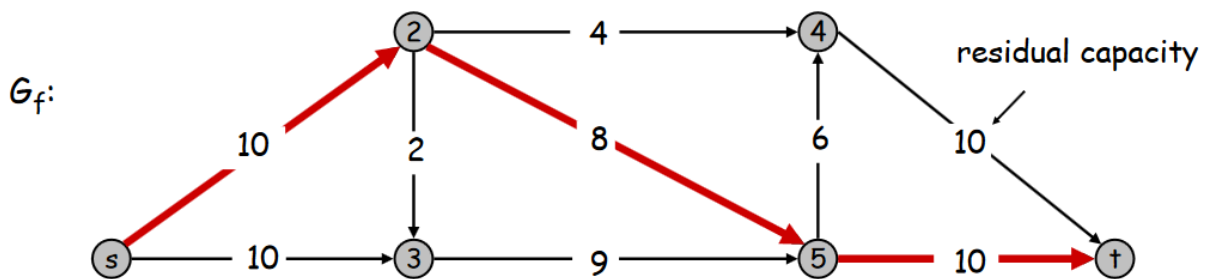
## Artificial Intelligence

G.Guérard

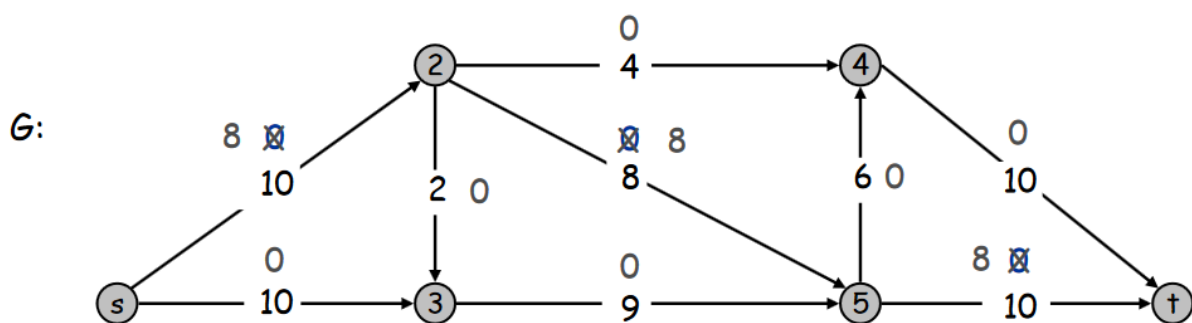
### Ford Fulkerson's algorithm: step by step



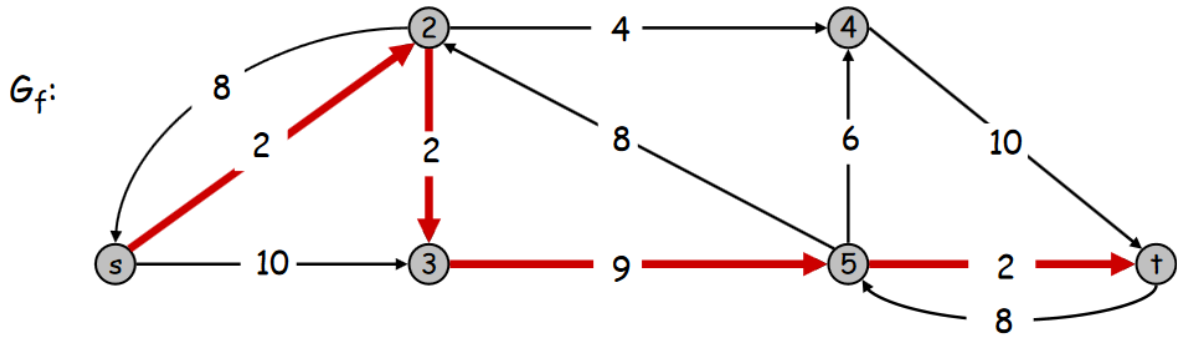
The initial flow is equal to zero. The residual graph  $G_f$  is here a copy of the graph  $G$ . We have to find a path from  $s$  to  $t$ , for example  $s-2-5-t$ :



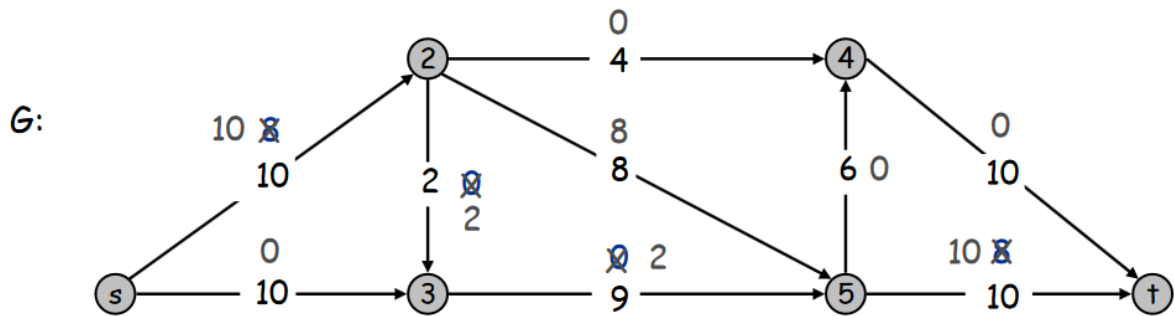
The minimal value on this path is 8. Thus, we have a flow equal to 8 on this path on the graph  $G$ .



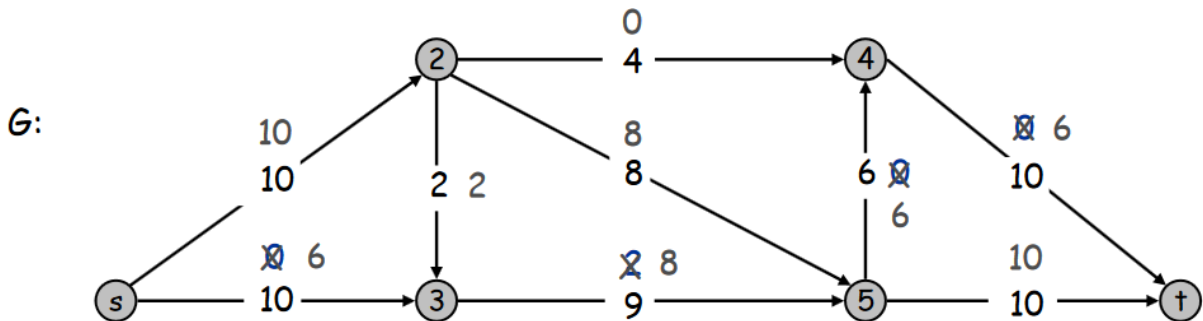
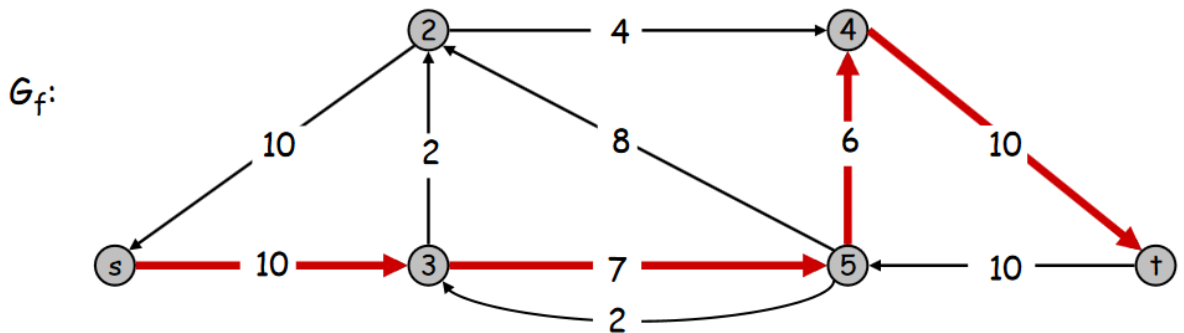
Remind that the residual graph represent the flow as a reverse arc. Construct the residual graph from this iteration:



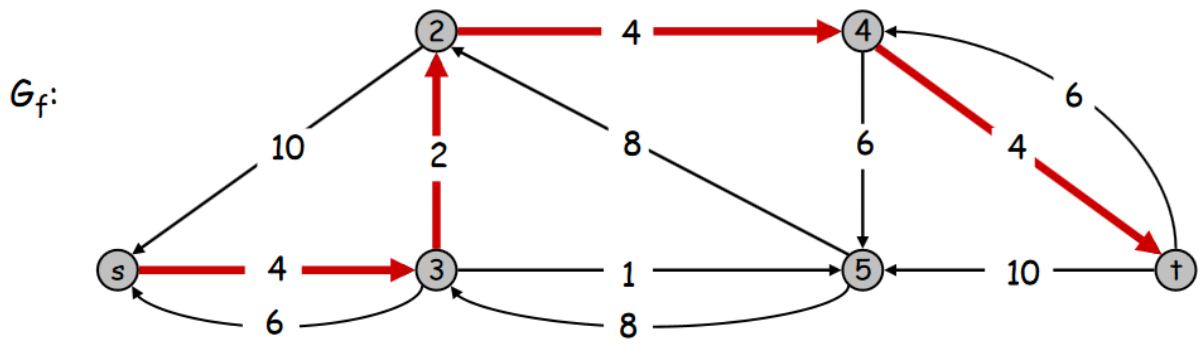
Here we choose the augmenting path  $s-2-3-5-t$ , with 2 as bottleneck. If we choose a reverse arc, the flow through the arc is reduce (not in this case, but it can happen).



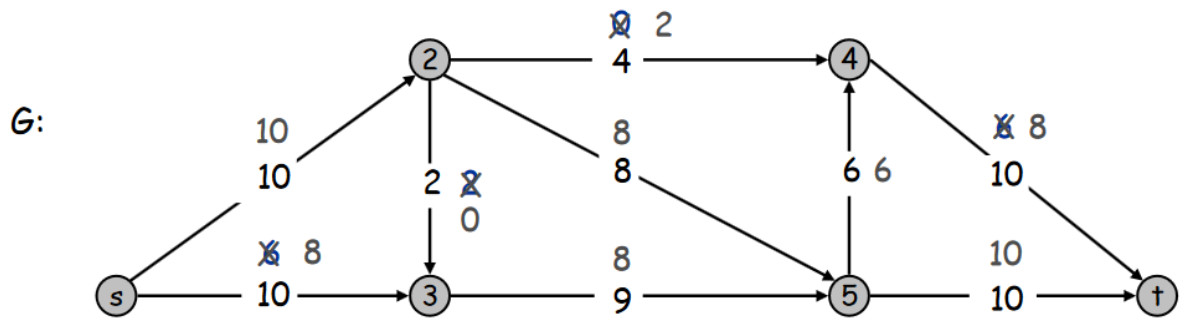
Flow Value = 10. On so on...



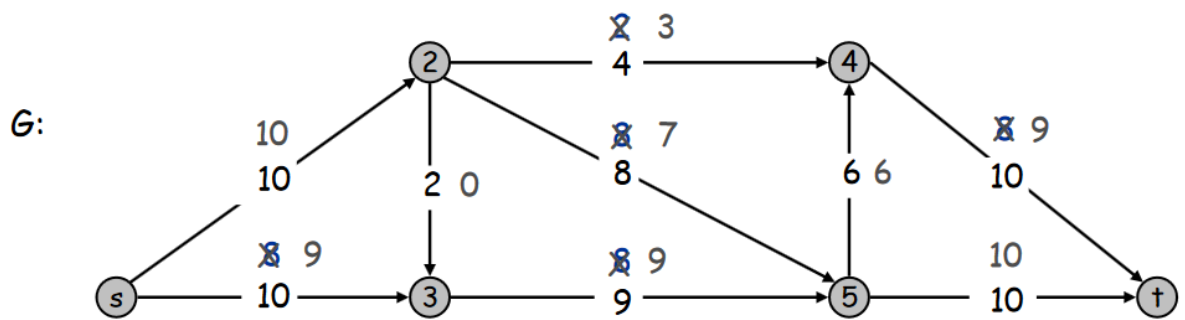
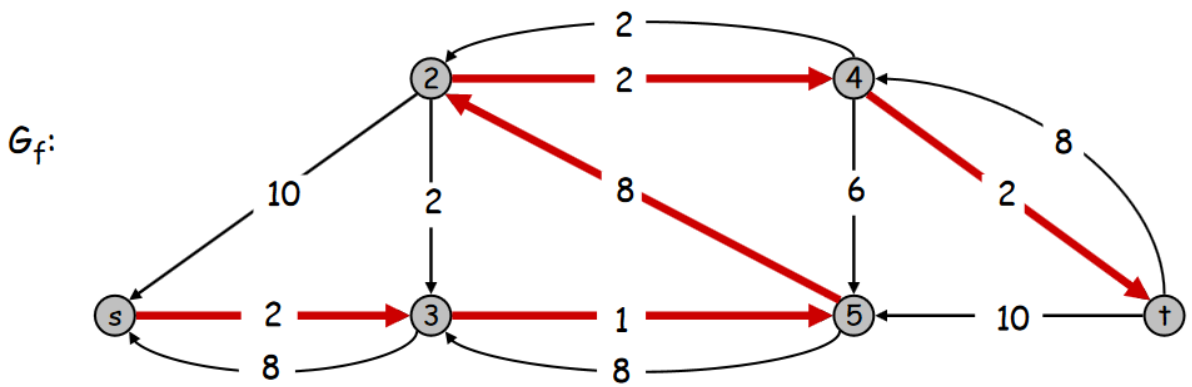
Flow value = 16



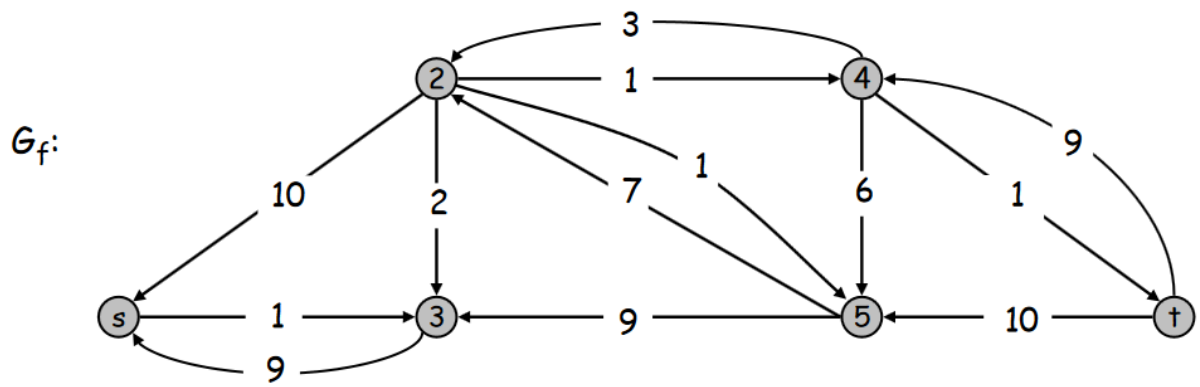
At this point, we choose the reverse arc (3,2), see what happened in the graph G below.



Flow value=18.



Flow Value=19.



No more path from  $s$  to  $t$ , we find an maximum flow on this graph. The cut analysis will be shown in practice 4.2.

### Exercise

Practice your skill on the following graphs:

