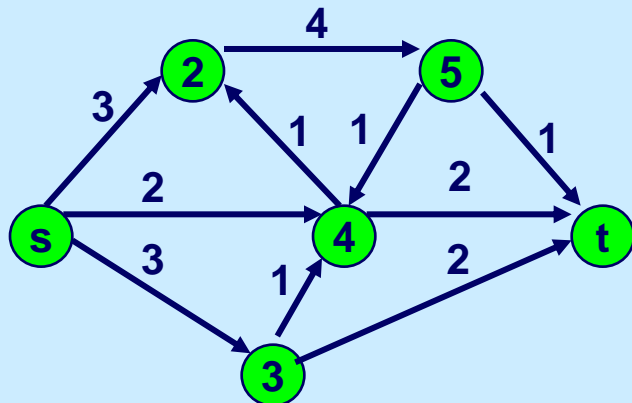
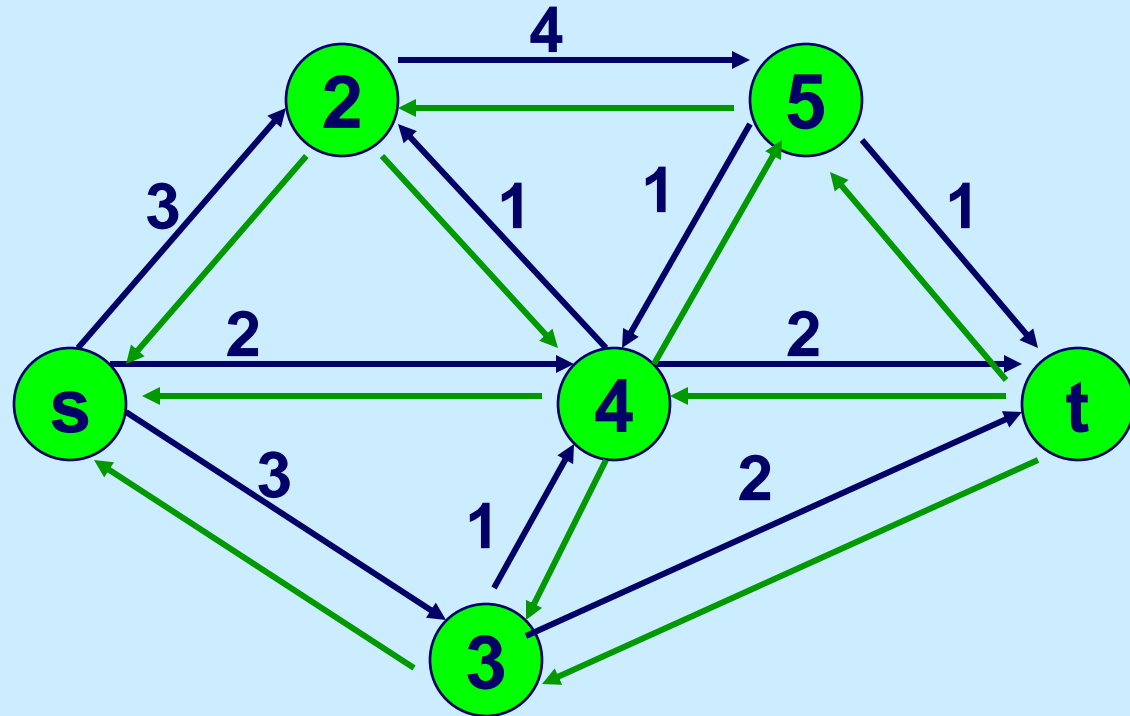


**15.082 & 6.855J & ESD.78J**  
**Algorithm Visualization**

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**The Ford-Fulkerson Augmenting  
Path Algorithm for the Maximum  
Flow Problem**

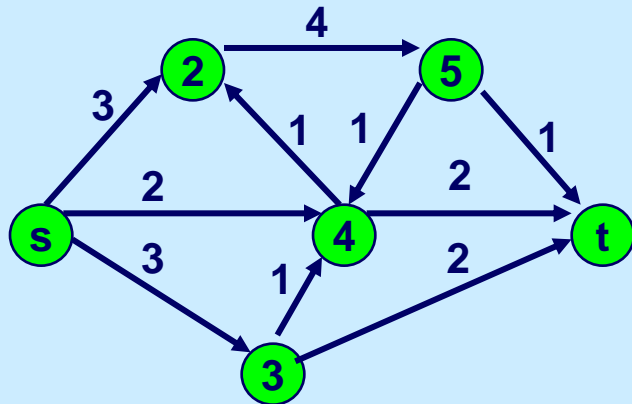
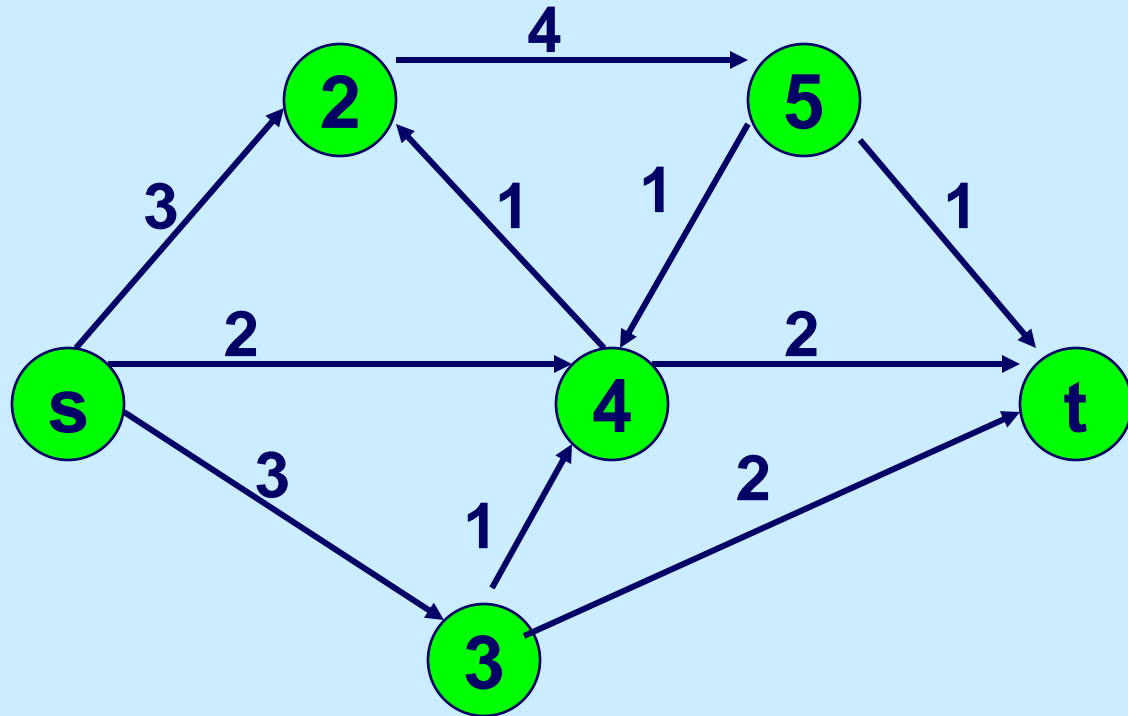
# Ford-Fulkerson Max Flow



This is the original network,  
plus reversals of the arcs.

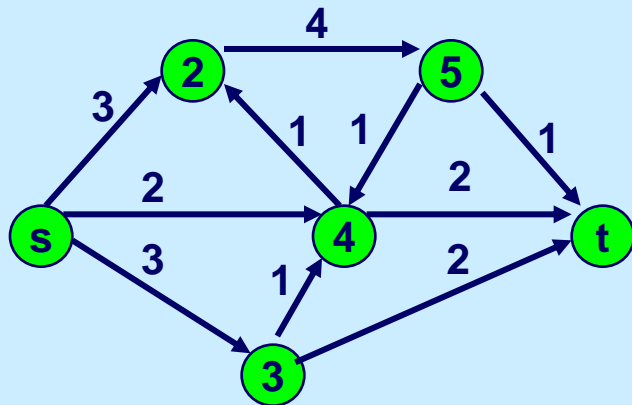
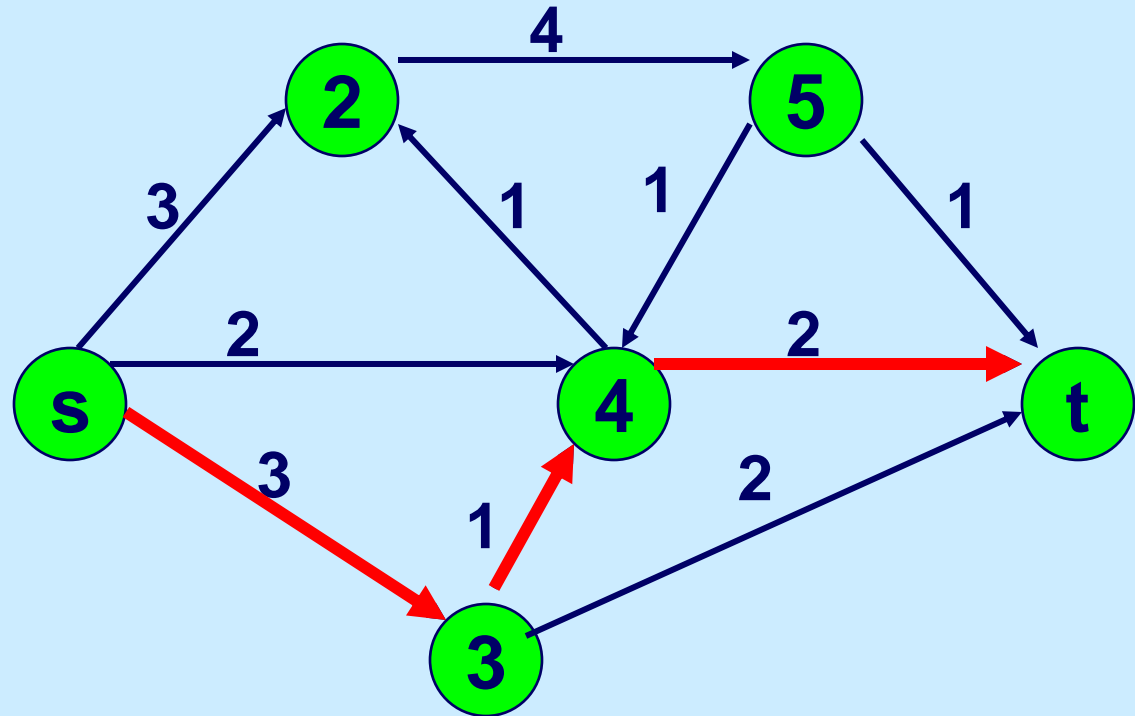
# Ford-Fulkerson Max Flow

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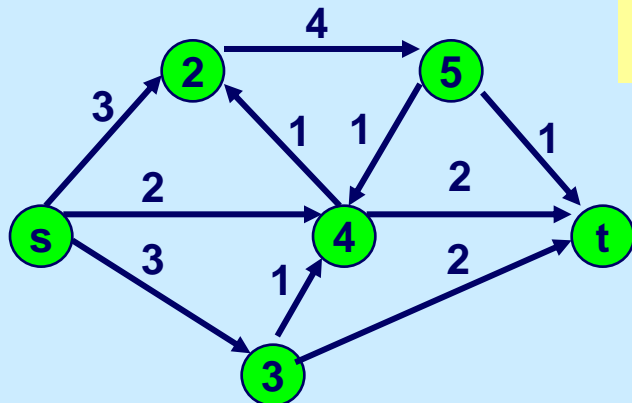
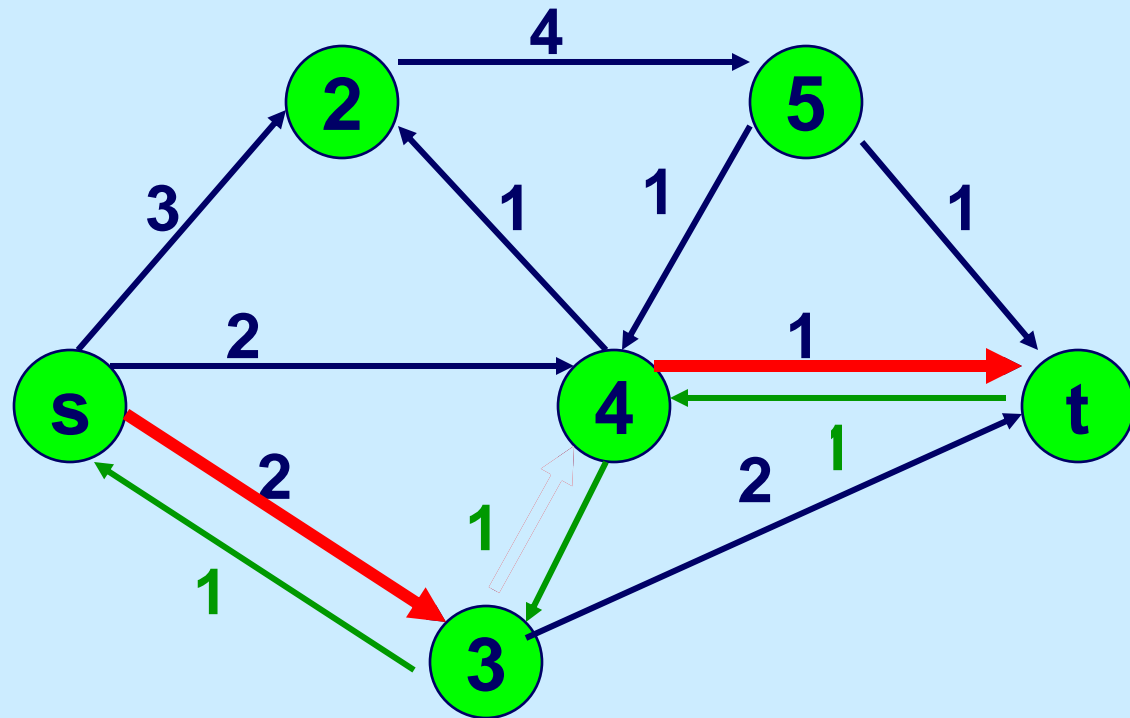
**This is the original network,  
and the original residual  
network.**

# Ford-Fulkerson Max Flow



Find any s-t path in  $G(x)$

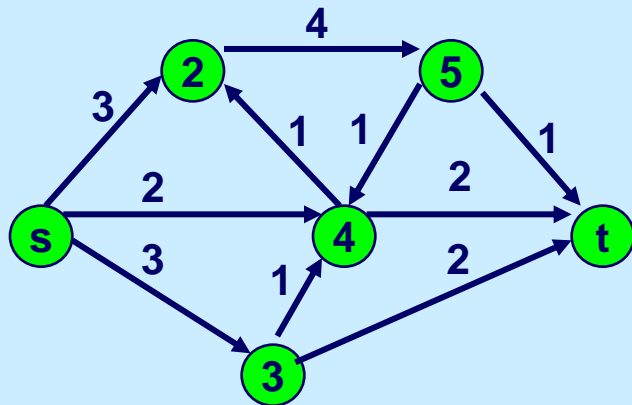
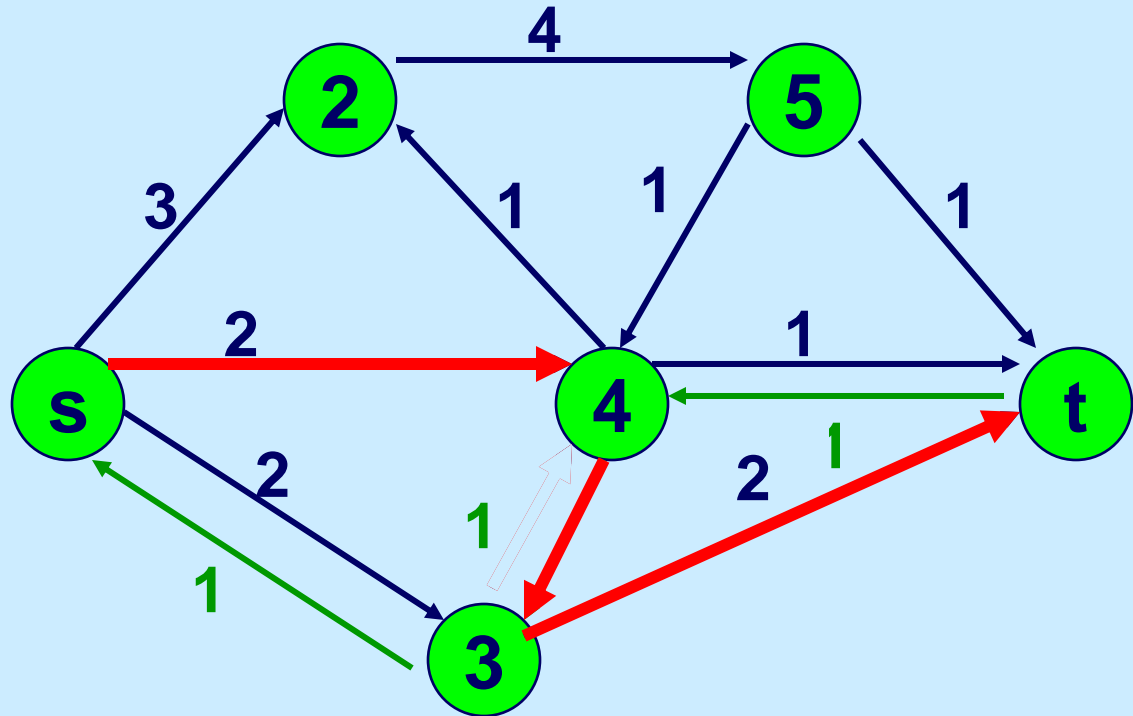
# Ford-Fulkerson Max Flow



**Determine the capacity  $\Delta$  of the path.**

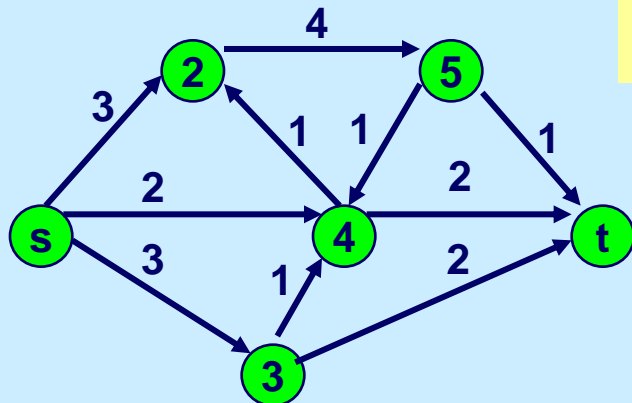
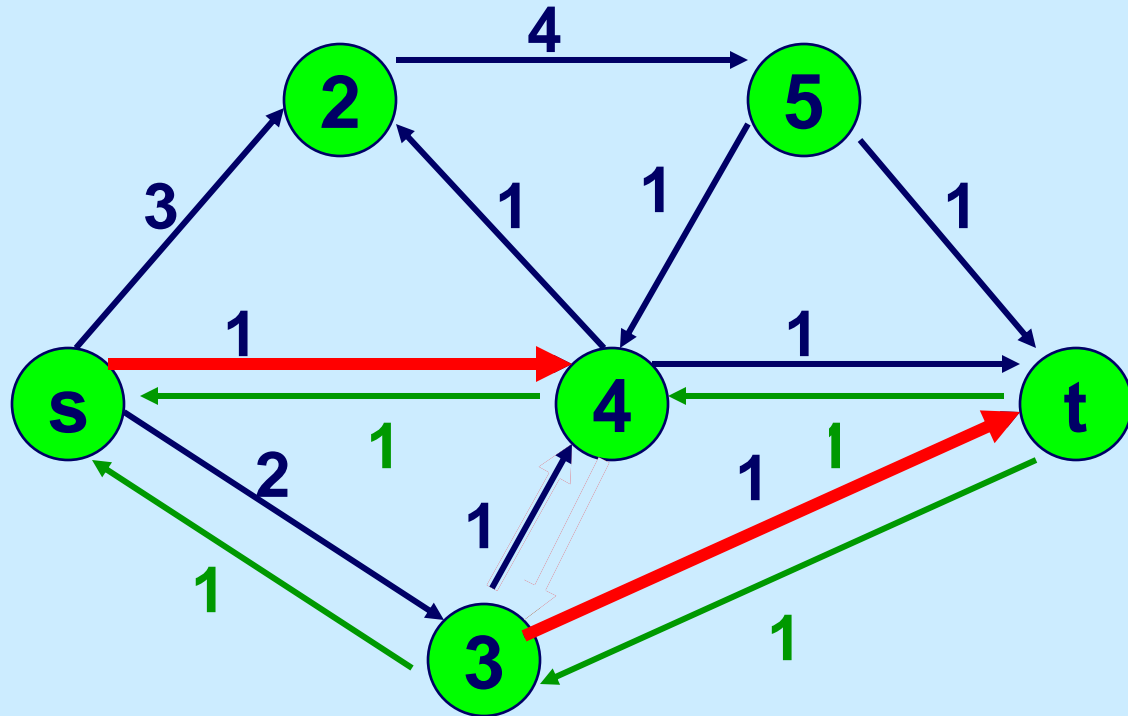
**Send  $\Delta$  units of flow in the path.  
Update residual capacities.**

# Ford-Fulkerson Max Flow



Find any s-t path

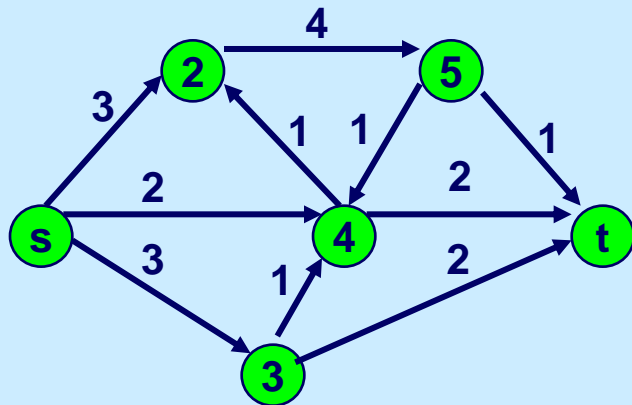
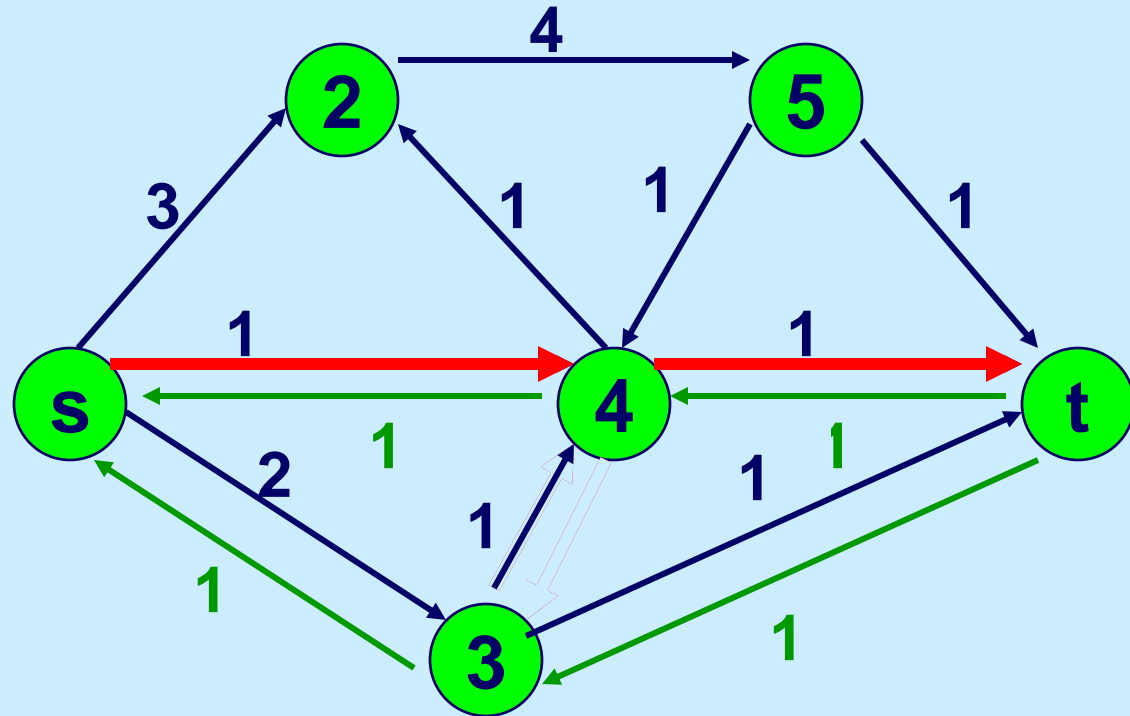
# Ford-Fulkerson Max Flow



**Determine the capacity  $\Delta$  of the path.**

**Send  $\Delta$  units of flow in the path.  
Update residual capacities.**

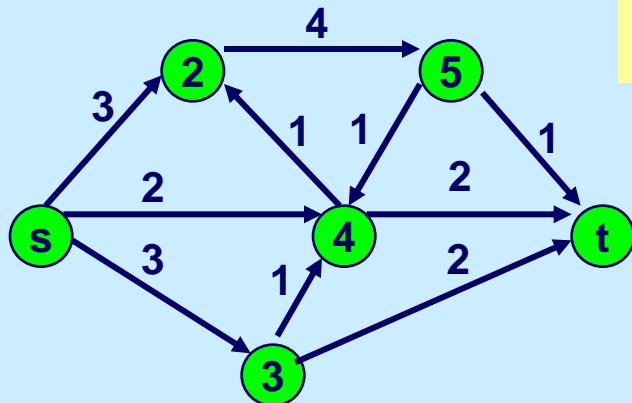
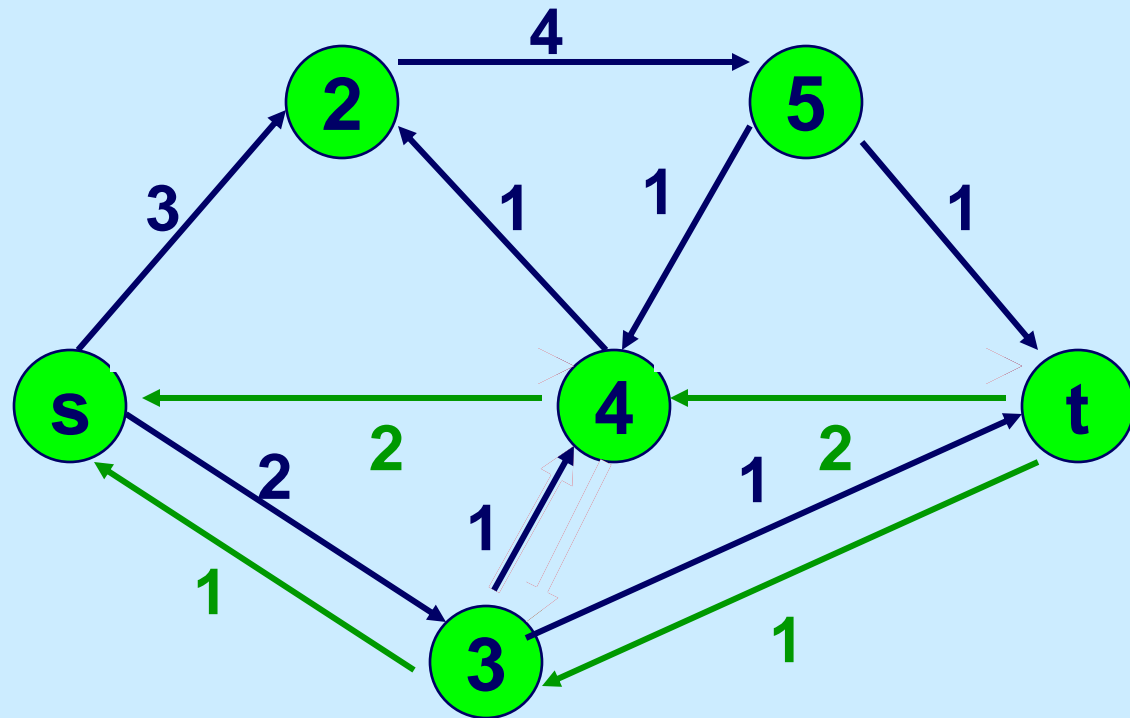
# Ford-Fulkerson Max Flow



Find any s-t path



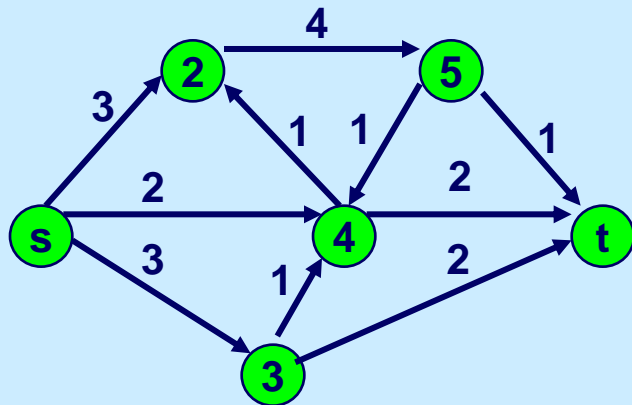
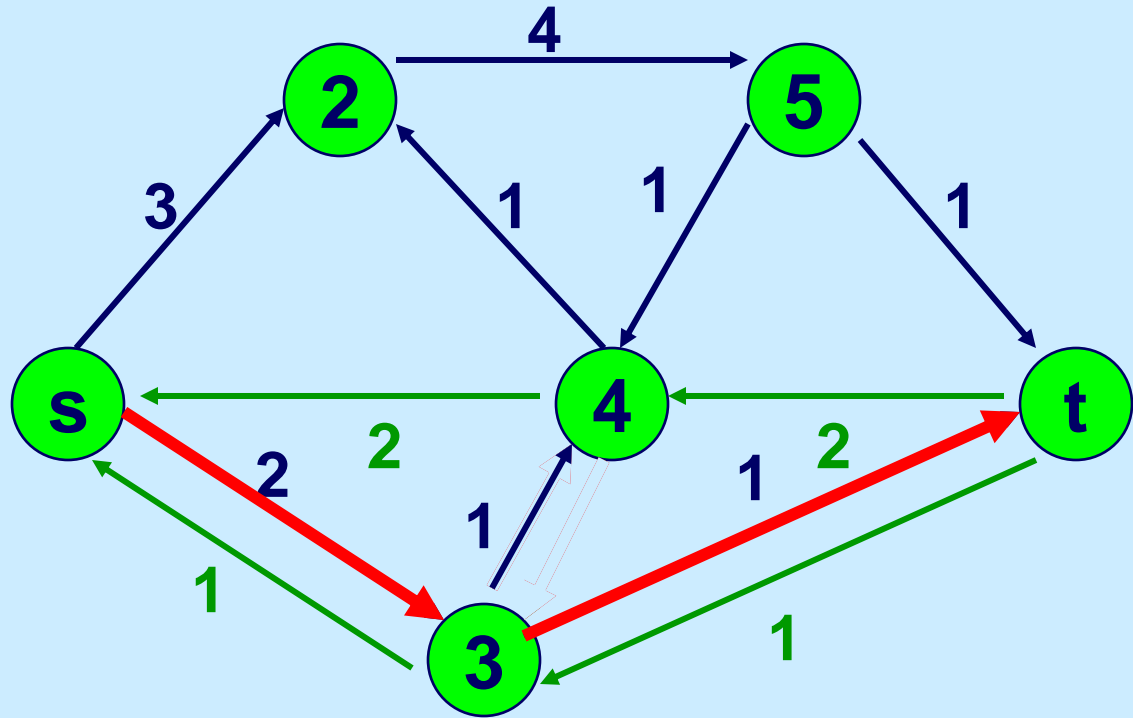
# Ford-Fulkerson Max Flow



**Determine the capacity  $\Delta$  of the path.**

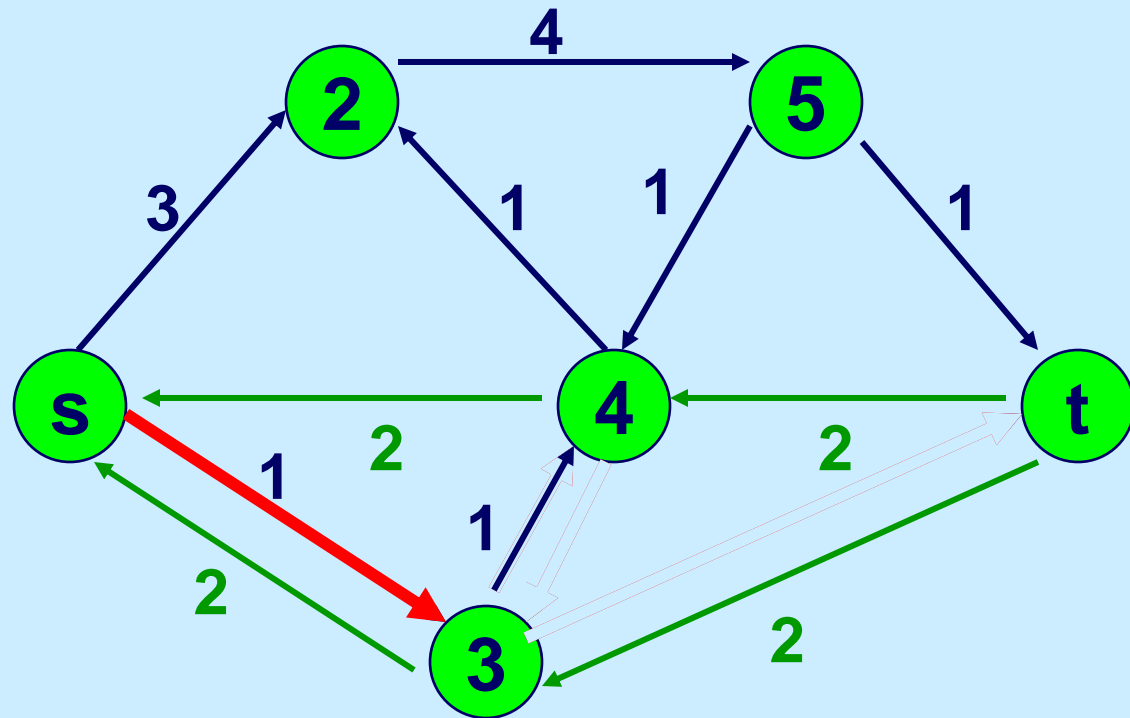
**Send  $\Delta$  units of flow in the path.  
Update residual capacities.**

# Ford-Fulkerson Max Flow



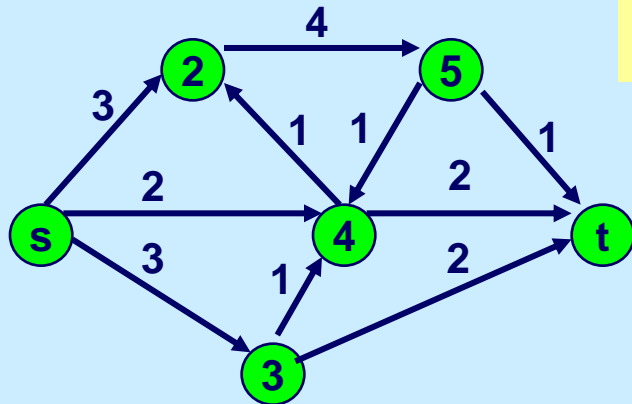
Find any s-t path

# Ford-Fulkerson Max Flow

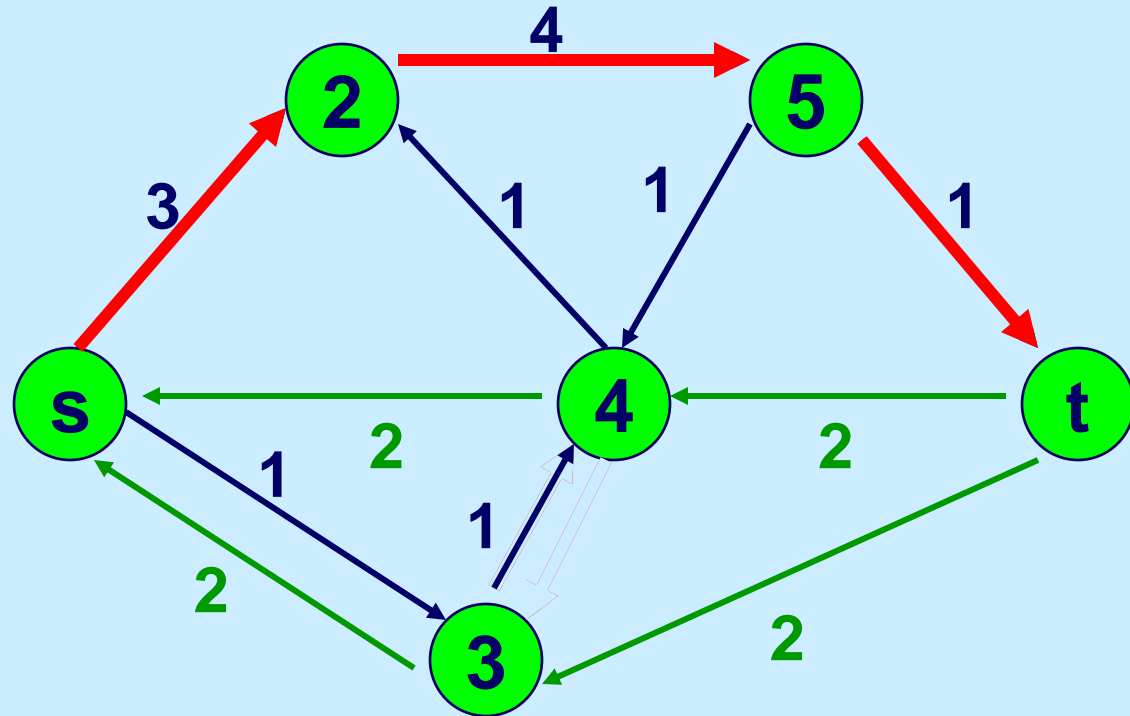


**Determine the capacity  $\Delta$  of the path.**

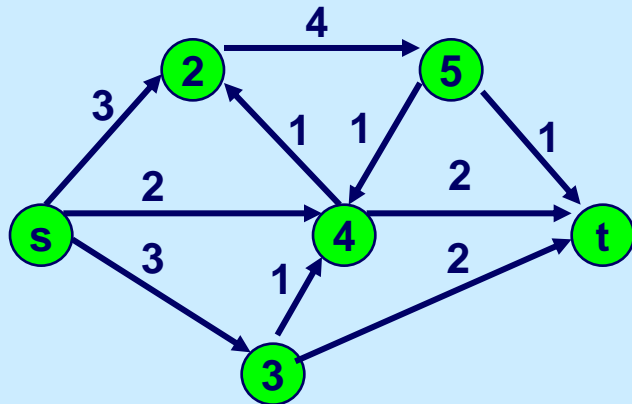
**Send  $\Delta$  units of flow in the path.  
Update residual capacities.**



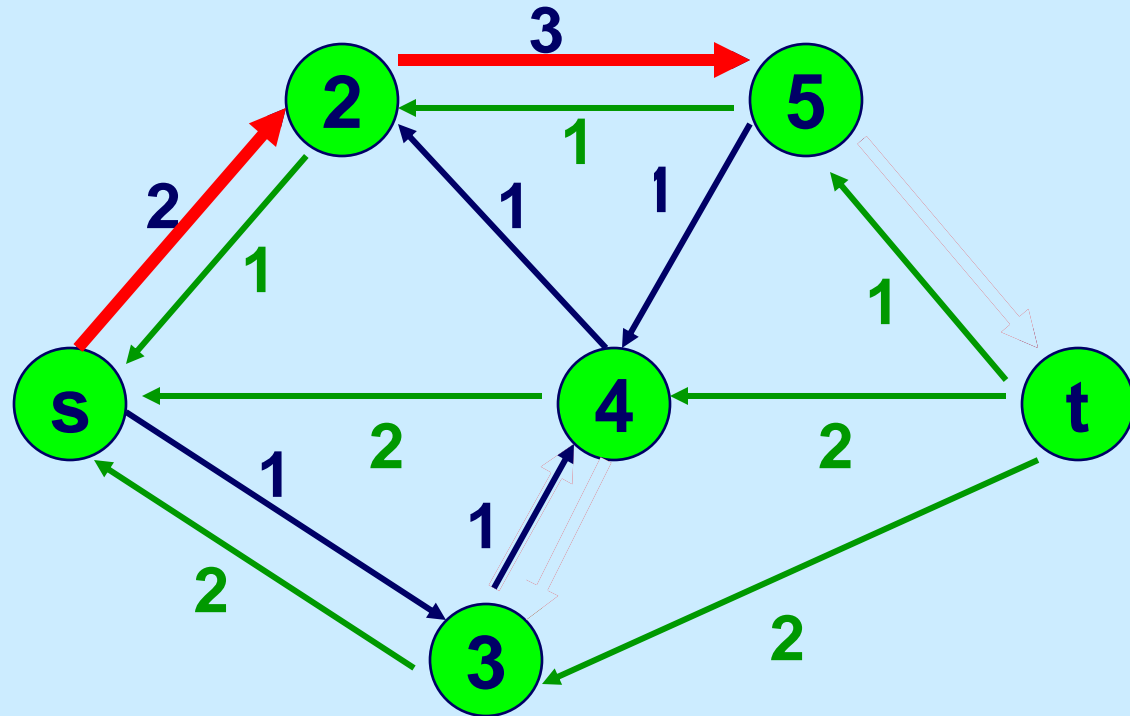
# Ford-Fulkerson Max Flow



Find any s-t path

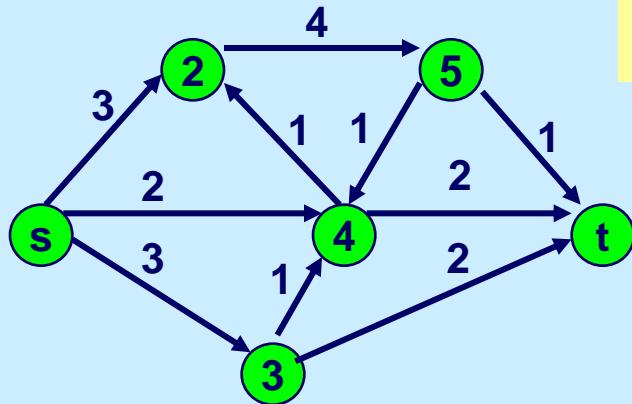


# Ford-Fulkerson Max Flow

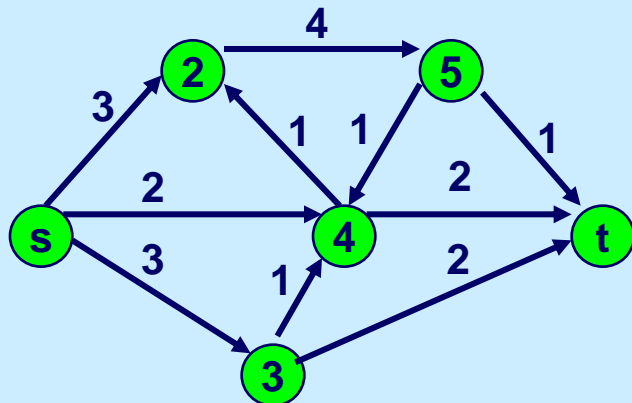
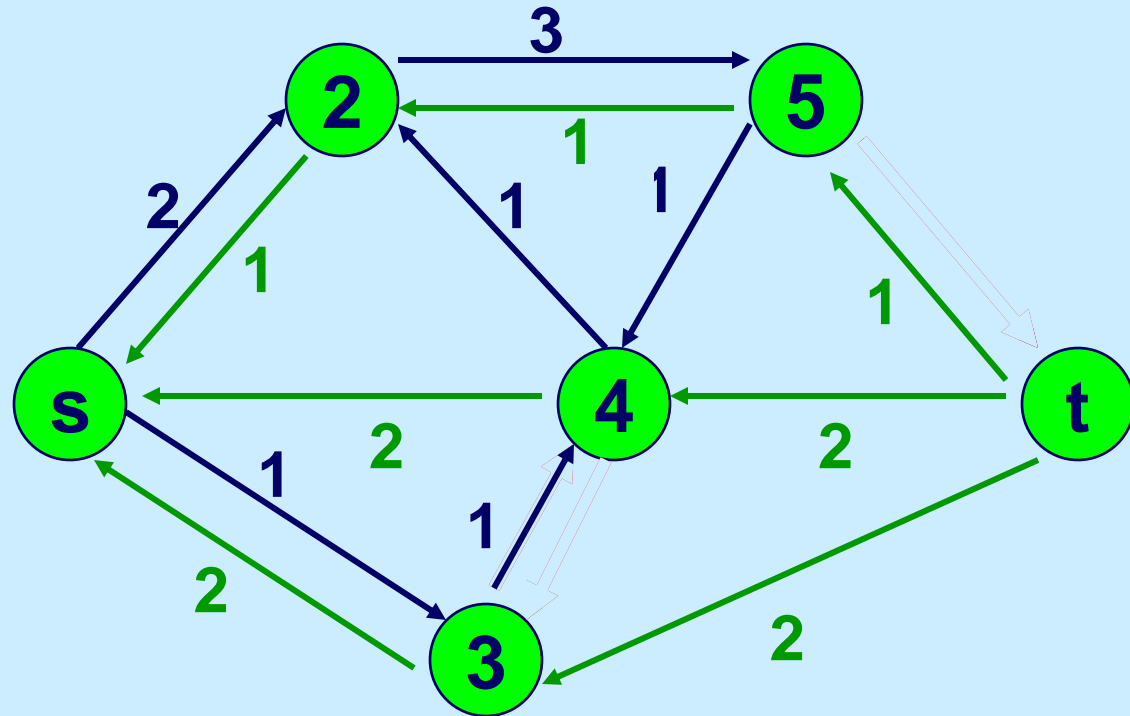


**Determine the capacity  $\Delta$  of the path.**

**Send  $\Delta$  units of flow in the path.  
Update residual capacities.**

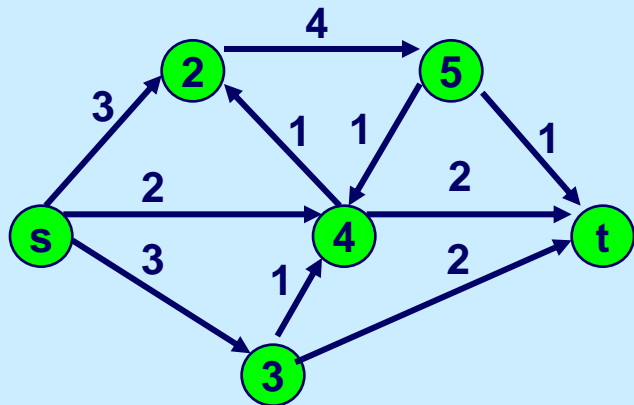
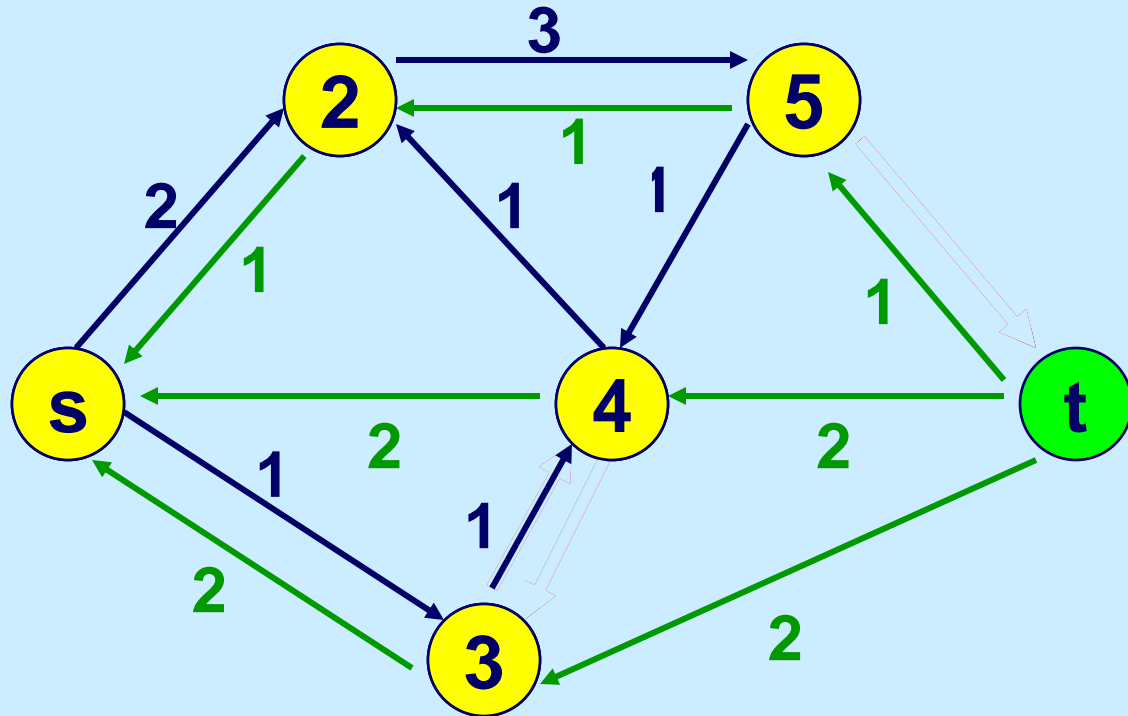


# Ford-Fulkerson Max Flow



**There is no s-t path in the residual network. This flow is optimal**

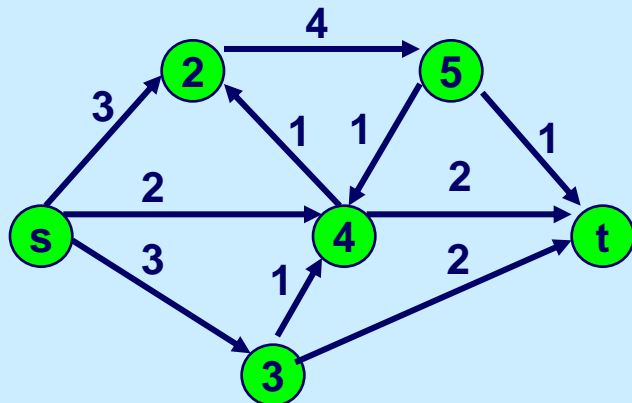
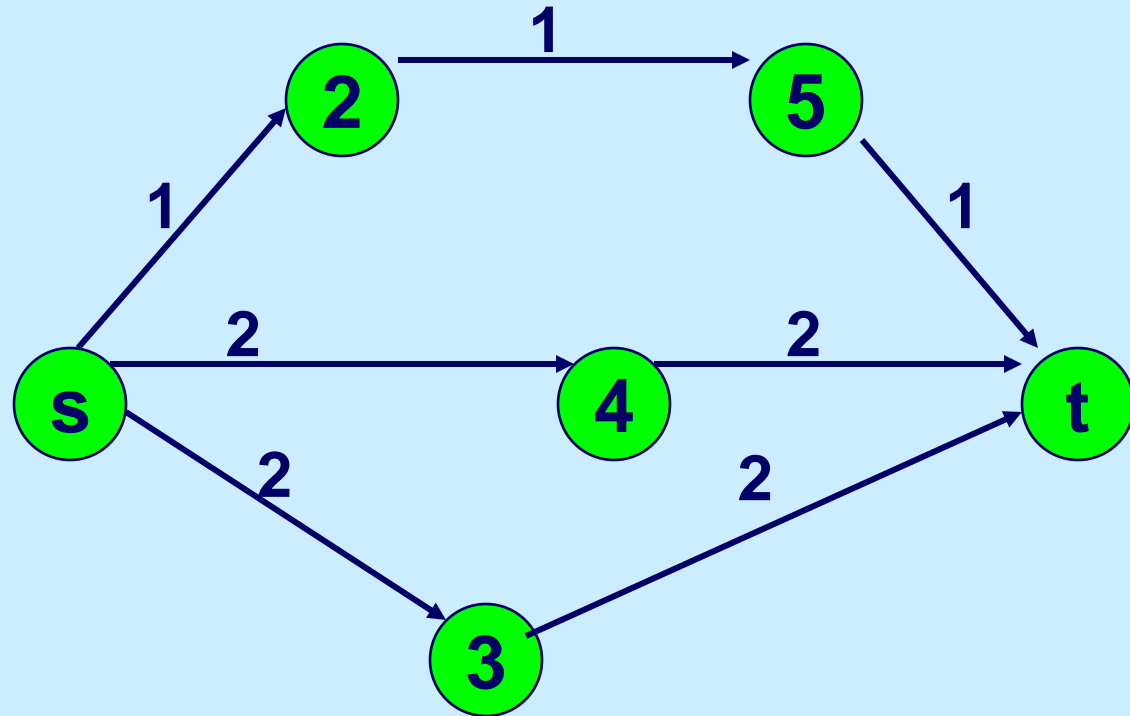
# Ford-Fulkerson Max Flow



These are the nodes that are reachable from node  $s$ .

# Ford-Fulkerson Max Flow

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Here is the optimal flow



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15.082J / 6.855J / ESD.78J Network Optimization  
Fall 2010

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