

# Reminder XI

- network, in ( $x$ ), out ( $x$ ),  $(A, B)$ ,
- st-network, capacity, flow, cut  $(U, U^c)$ ,
- $\text{val}(f) = f(U, U^c) - f(U^c, U) \quad \forall \text{ cut } (U, U^c)$   
 $\leq c(U, U^c) \quad \forall \text{ cut } (U, U^c)$   
*exists if  $c: E \rightarrow \mathbb{Q}$  or  $\mathbb{N}$ .*
- $\Rightarrow$  max flow  $f^*$ , min cut  $(U^*, U^{*c})$   
*always exists.*
- with  $\text{val}(f) \leq \text{val}(f^*) \quad \forall \text{ flow } f$ .
- st-path, st-quasi path, increase of flow  
 $\Rightarrow$  algorithm for finding  $f^*$ .
- st-network with  $c=1 \Rightarrow \text{val}(f^*) = \# \text{ edge}$

disjoint st-paths.

## Applications

- Maximal matching for bipartite graphs
- Transversal,  $V_1$ -saturated matching  
*necessary and sufficient condition:  $|U| \leq |N(U)| \quad \forall U \subseteq V_1$ .*
- The pairing problem ...