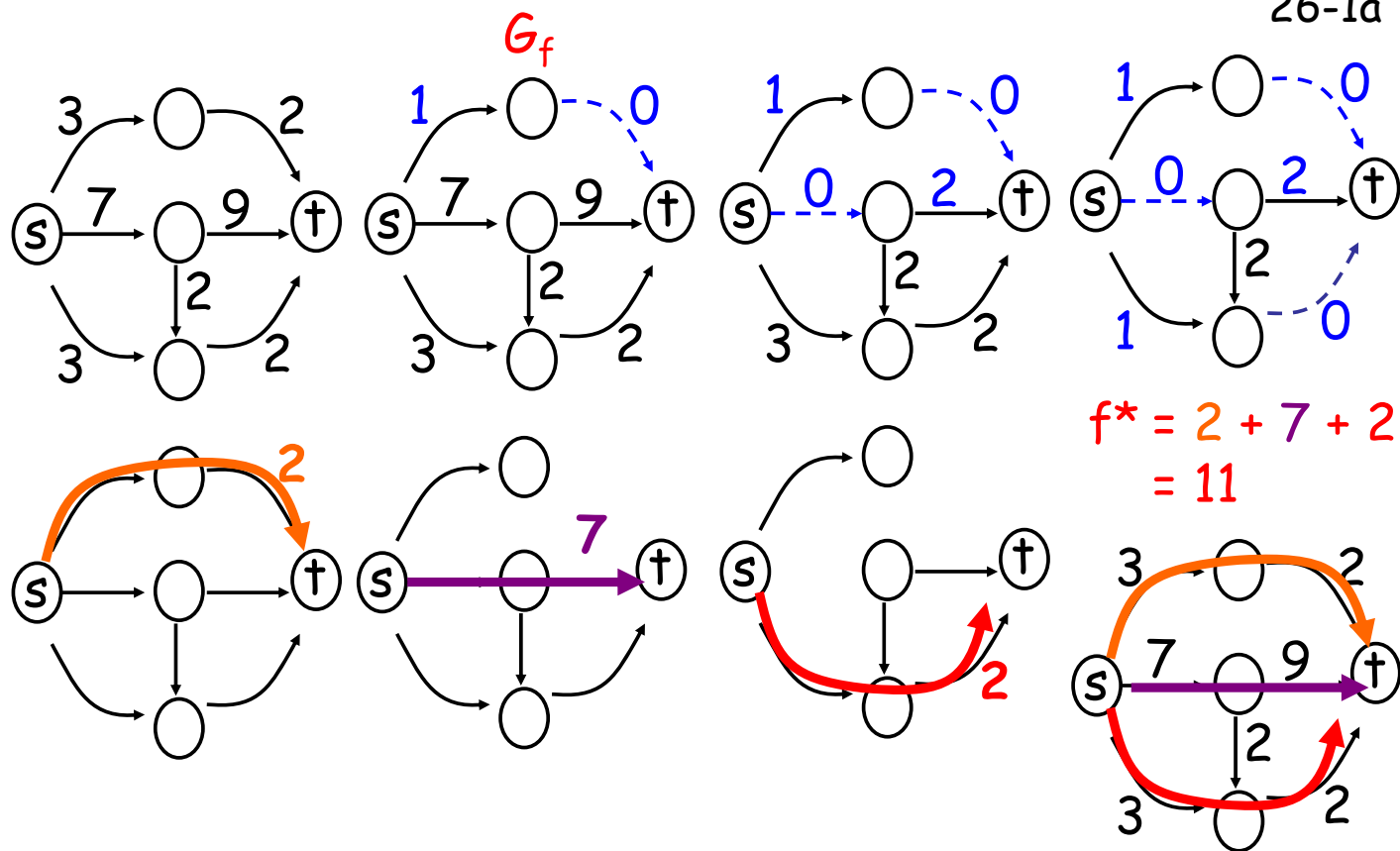
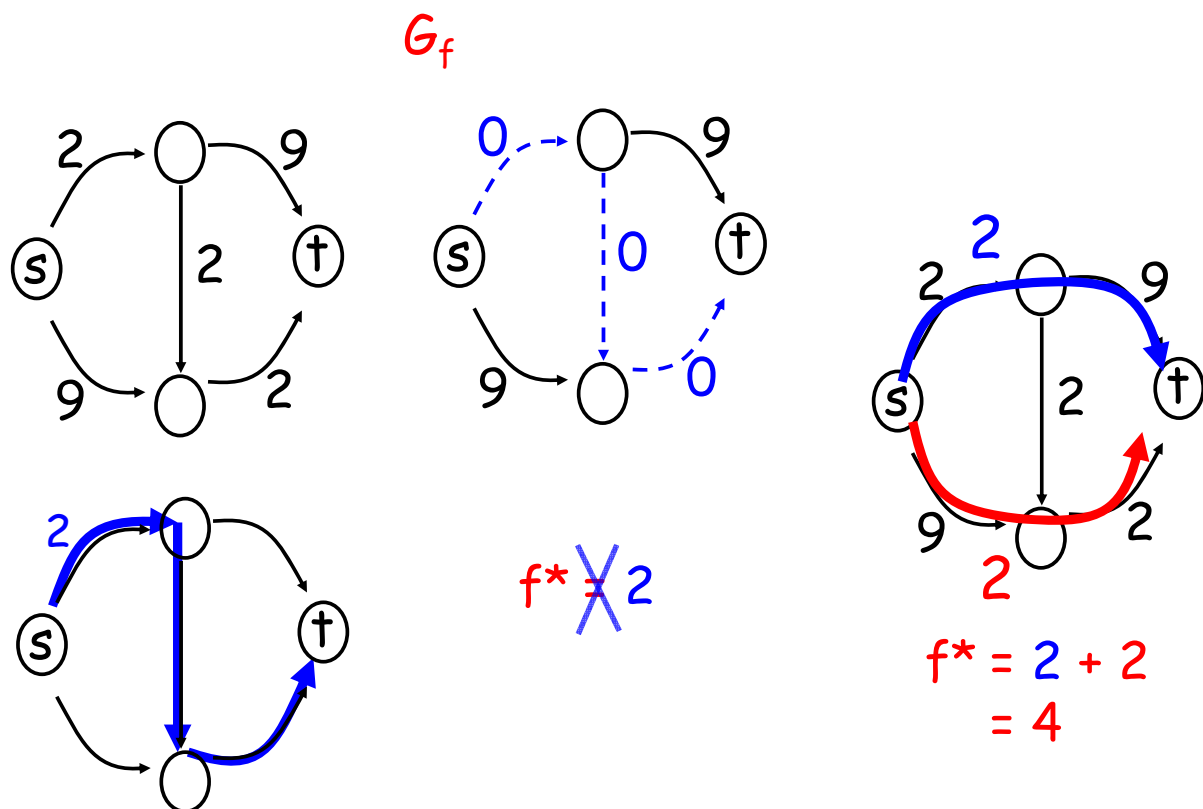
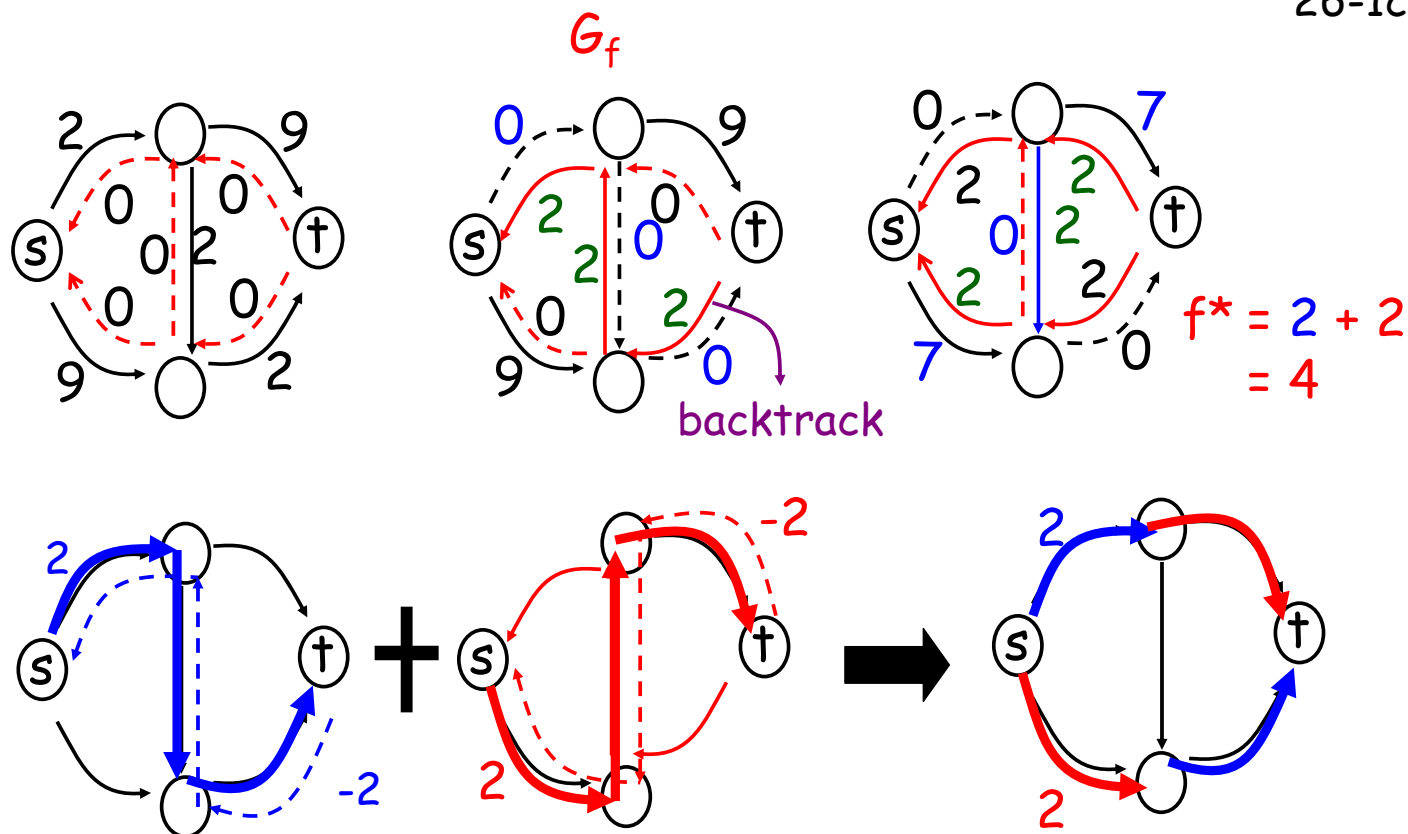


26-1a



26-1b





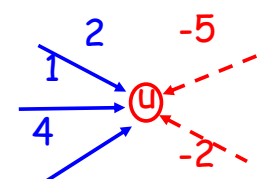
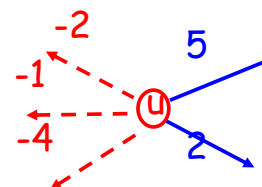
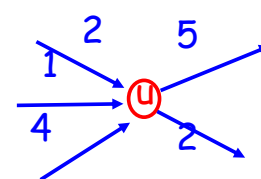
**Flow Conservation:** for all  $u \in V - \{s, t\}$

$$\sum_{v \in V, f(v, u) > 0} f(v, u) = \sum_{v \in V, f(u, v) > 0} f(u, v)$$

(positive in = positive out)

$$\sum_{v \in V} f(u, v) = 0 \text{ (total out = 0)}$$

$$\sum_{v \in V} f(v, u) = 0 \text{ (total in = 0)}$$



# Corollary 26.6

26-6a

$G, f$

$\textcircled{S}$  S T  $\textcircled{t}$

$\textcircled{u} \xrightarrow{f(u,v)/c(u,v)} \textcircled{v}$

$$f(u, v) \leq c(u, v)$$

$\Rightarrow \sum_{u \in S, v \in T} f(u, v) \leq \sum_{u \in S, v \in T} c(u, v)$

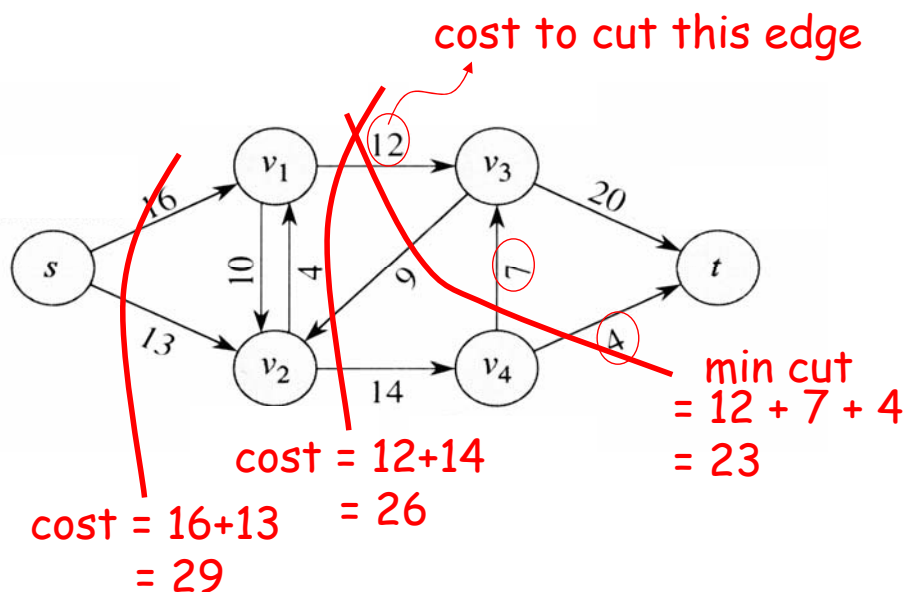
$\Rightarrow f(S, T) \leq c(S, T)$

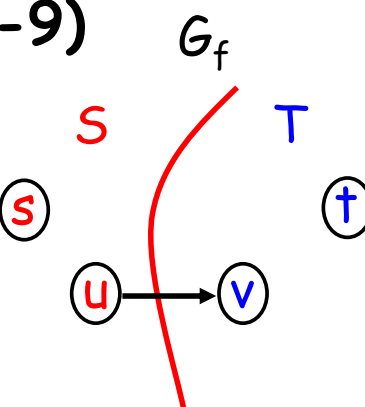
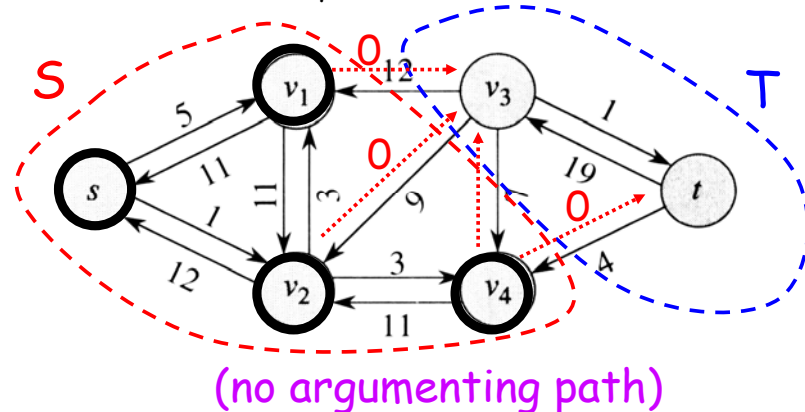
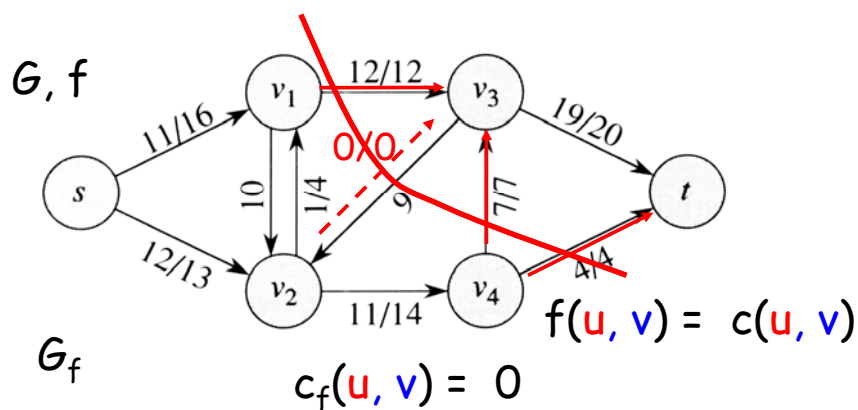
$\Rightarrow |f| \leq c(S, T)$

(by Lemma 26.5:  $f(S, T) = |f|$ )

## The min cut problem

26-7a



Thm. 26.7 (2)  $\rightarrow$  (3) (See 26-9)

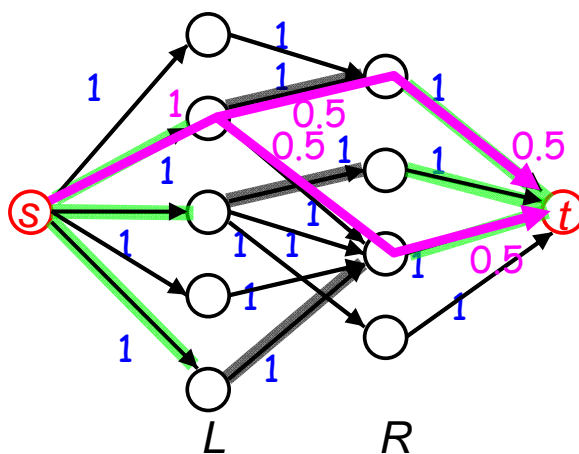
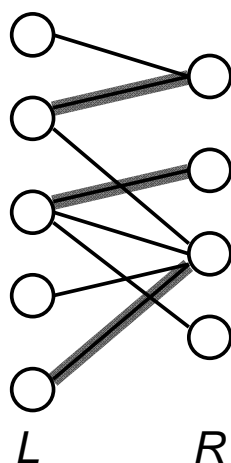
no augmenting path

$$\Rightarrow c_f(u, v) = 0$$

$$\Rightarrow f(u, v) = c(u, v)$$

$$\Rightarrow \sum_{u \in S, v \in T} f(u, v) = \sum_{u \in S, v \in T} c(u, v)$$

$$\Rightarrow f(S, T) = c(S, T)$$

\* matching  $\rightarrow$  flow\* flow  $\not\rightarrow$  matching? \* integer flow  $\rightarrow$  matching\* integer flow  $\leftrightarrow$  matching\* max integer flow  $\leftrightarrow$  max matching