1 Proof of Sheet 4, Ex11

IH:
After each iteration of the while-loop of FordFulkerson $f(u,v)$ is even $\forall u, v \in V$

IB: $i = 0:$ $\quad f(u,v) = 0 \quad \forall u, v \in V$

IS: $i-1 \to i$ (assuming augmenting path exists)
$\Rightarrow c_f(u,v) = c(u,v) - f(u,v)$ even, since IH and $c(u,v)$ even.
$\Rightarrow c_f(P) = \min\{c_f(u,v) | (u,v) \in P\}$

$$f_P(u,v) = \begin{cases} c_f(P), & \text{if } (u,v) \in P \\ -c_f(P), & \text{if } (v,u) \in P \\ 0, \text{ otherwise} \end{cases}$$

$\Rightarrow f(u,v) = \underbrace{f(u,v)}_{\text{IH}} + \underbrace{f_P(u,v)}_{\text{even}}$
$\Rightarrow f'(u,v)$ even $\quad \forall u, v \in V$