Max_Flow_Δ(G(V,E), C, s, t)

O(m) for all $e \in E$ $f(e) = \infty$

Δ = largest pow. of two that is less than C_{max}

while($\Delta \geq 1$)

  $G_f^{\Delta} = \Delta$-Residual(G, f)

  while($\exists$ Path $P: s \rightsquigarrow t$) O(m)

    f = augment(G, f, P)

    update G_f^{Δ} O(n)

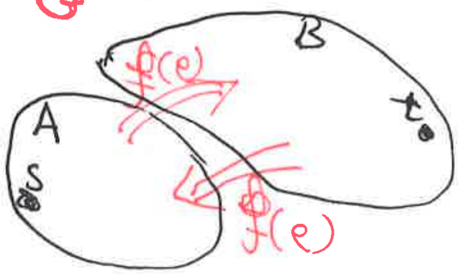
  $\Delta = \Delta/2$ O(n)

return f

log c

?

?? G



$$v_A(f) = \sum_{\text{out } A} f(e) - \sum_{\text{in } A} f(e)$$

$$\geq \sum_{\text{out } A} c(e) - \Delta - \sum_{\text{in } A} \Delta$$

Cap(A,B)

$$\geq \boxed{\sum_{\text{out } A} c(e)} - m\Delta$$

$$= Cap(A,B) - m\Delta \geq v(f^*) - m\Delta$$

$\forall \Delta$

(A) min path flow = Δ

(B)

by the end of an iteration

$$v(f^*) \leq v(f) + \Delta m \text{ ??}$$

at the begining of an iteration

$$v(f^*) \leq v(f) + m\Delta'$$

2Δ

$$v(f^*) \leq v(f) + 2m\Delta$$

$\Rightarrow$ for every Δ, at most 2m iteration

$\Rightarrow$ Max # Paths = 2m log C

$\Rightarrow O(m^2 \log c)$