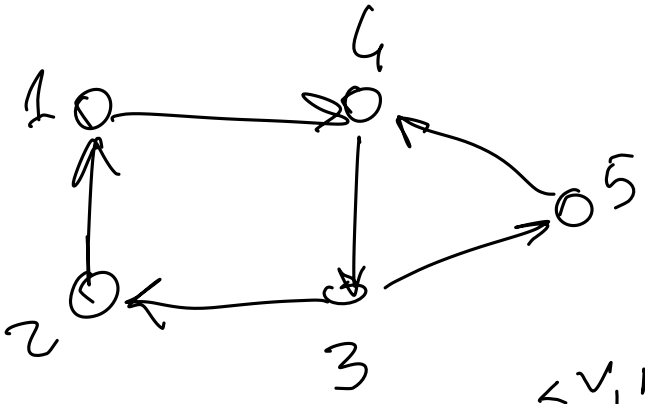
REACH $\in L = DSPACE(\log n)$

REACH $\in DSPACE(\log^2 n)$

$(\log n)^2$



$s = 2$, $t = 5$

$S, 1, 4, 3, t$

$= \langle V, A \rangle$

existsPath (G, s, t, k) existsPath$(G, s, t, |A|)$

{ if $k = 0$

  { if $s = t$ ACCEPT

    else REJECT

  }

  if $k = 1$

  { if $(s,t) \in A$ ACCEPT

    else REJECT

  }

  for each $u \in V$

  { if existsPath $(G, s, u, \lfloor k/2 \rfloor)$ AND

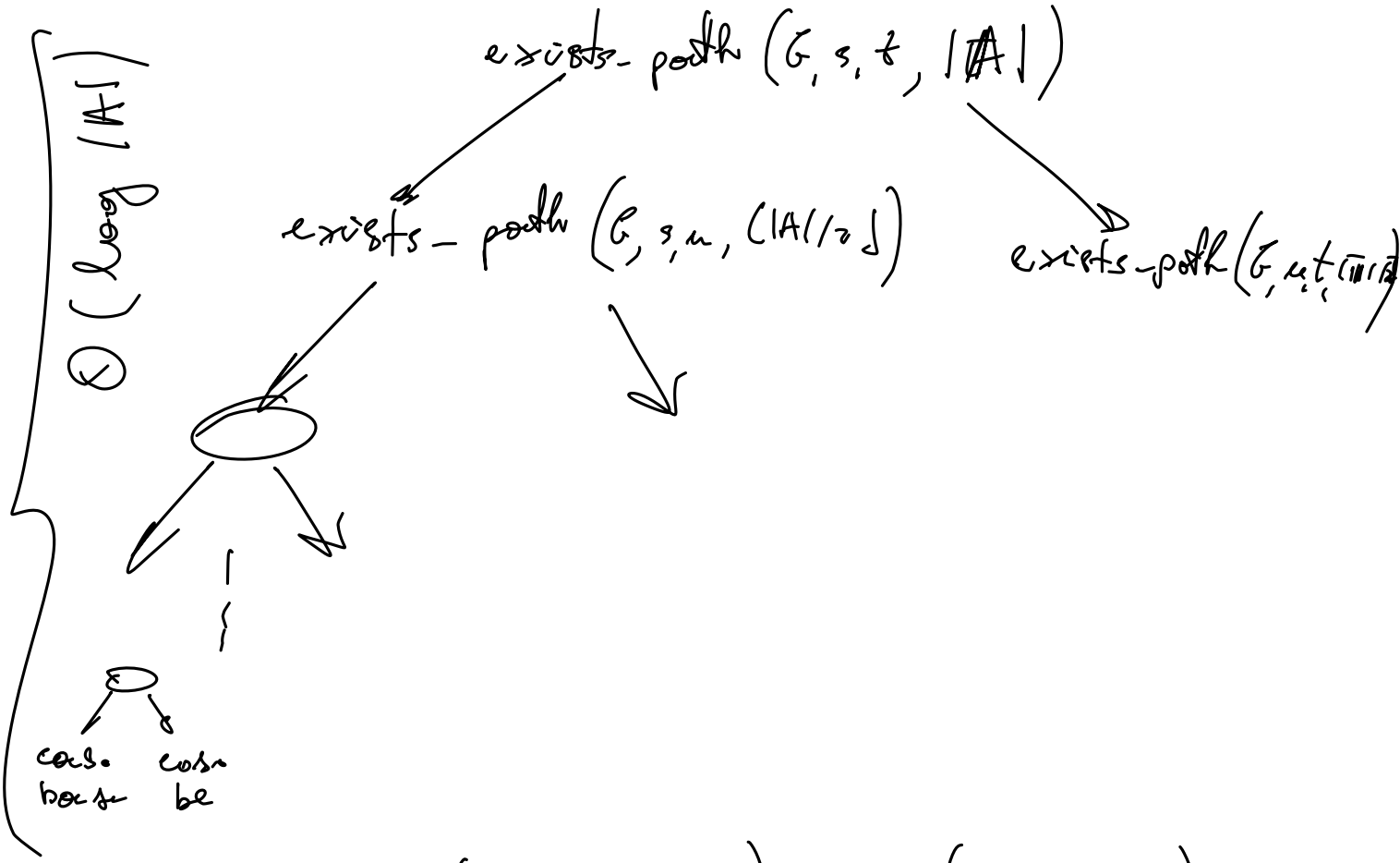
      existsPath $(G, u, t, \lceil k/2 \rceil)$ ACCEPT

  }

  REJECT

}

PER RICORRIVE ARG s, t, u $\Theta(\log n)$



$$\Longrightarrow O(\log |A|) \cdot O(\log n)$$

$$\rightarrow O(\log^2 n)$$

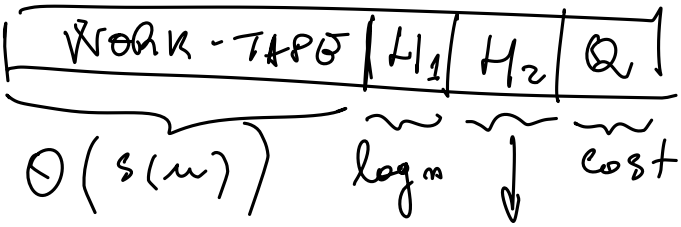
THEOREM (SAVITCH)

SIA $S(n)$ UNA SPACE FUNCTION t.c. $S(n) \in \Omega(\log n)$. ALLORA

$$NSPACE(S(n)) \subseteq DSPACE(S(n)^2)$$

DIM:

SIA $L \in NSPACE(S(n))$ ESISTE UNA MACCHINA M NON-DET t.c. $\mathcal{L}(M) = L$ E LA SUA RUNNING SPACE È $S(n)$



SICCOME $S(n) \in \Omega(\log n)$ TUTTA LA LABEL RICHIEDE $O(S(n))$ SIMBOLI

SIA $l = |\Gamma|$

$O(l^{S(n)})$ NUM. NODI

$O((l^{S(n)})^2) \to O(l^{2 \cdot S(n)})$ NUM. ARCHI

COMPL. SPAZIALE $\quad$ exists_path $O(\log^2 n)$

$O((\log l^{2 \cdot S(n)})^2) \Rightarrow O((\underbrace{2 \cdot S(n)}_{\text{cost}} \cdot \underbrace{\log l}_{\text{cost}})^2)$

$O(S(n)^2)$

$$PSPACE = \bigcup_{c \geq 1} DSPACE(n^c)$$

$$NPSPACE = \bigcup_{c \geq 1} NSPACE(n^c)$$

$$PSPACE \subseteq NPSPACE$$

$$PSPACE = NPSPACE \quad (\text{Savitch})$$