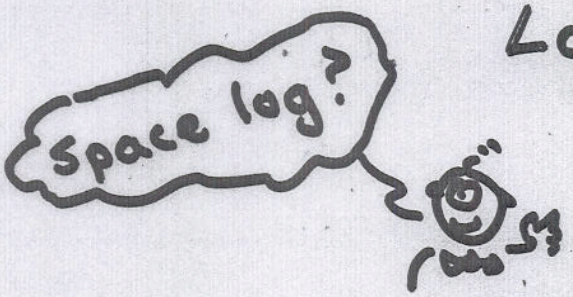
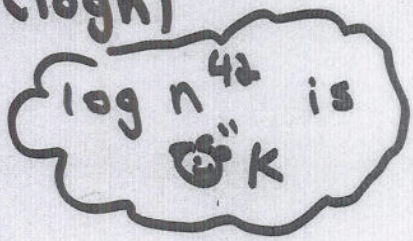
Log Space!

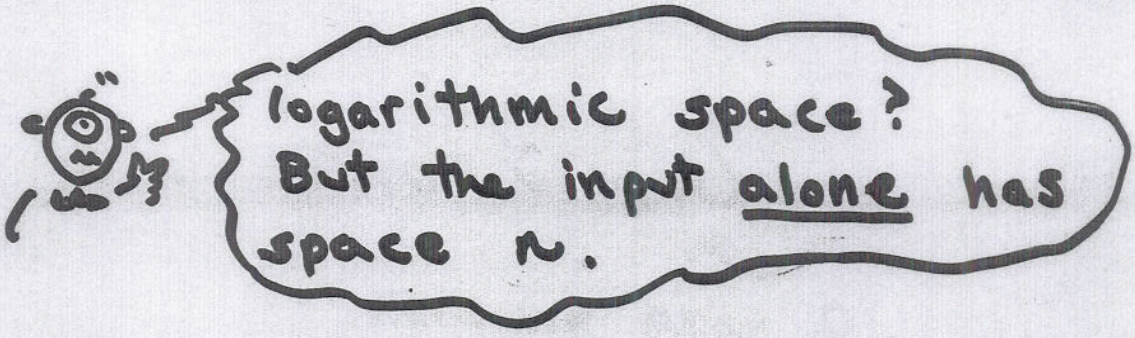


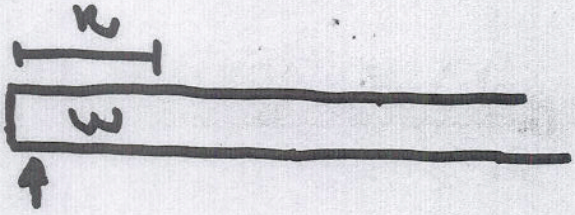
- $L = SPACE(\log n)$

Here we mean $O(\log n)$

- $NL = NSPACE(\log n)$







read-only input tape (2-way)

read/write work tape

Try these!

Ex 1

$L = \{ 0^i 1^i \mid i \geq 0 \}$ $\in L$?

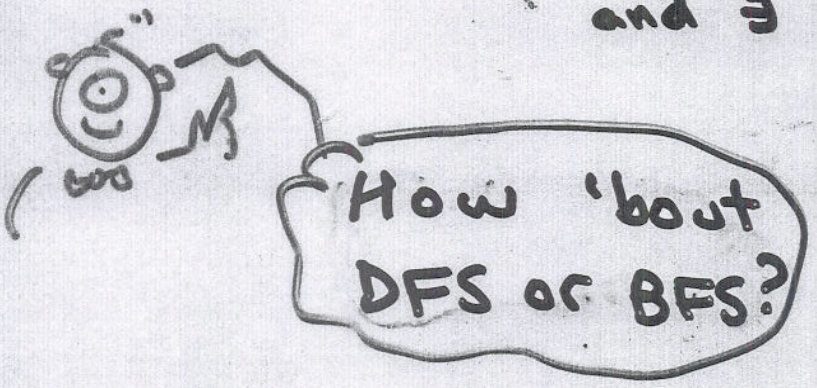
$\in NL$?

Ex 2

PATH = $\{ \langle G, s, t \rangle \mid$ G is a digraph and $\exists$ path from s to t$\}$

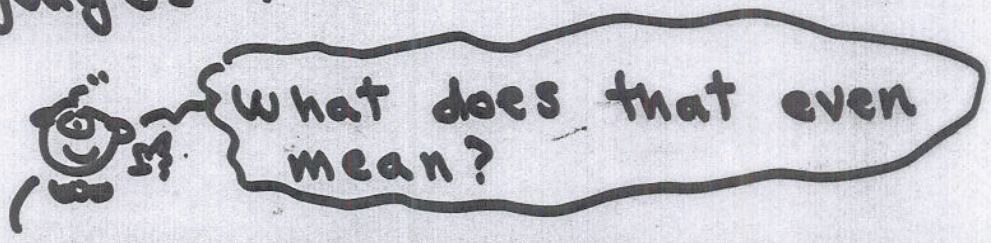
$\in L$?

$\in NL$?

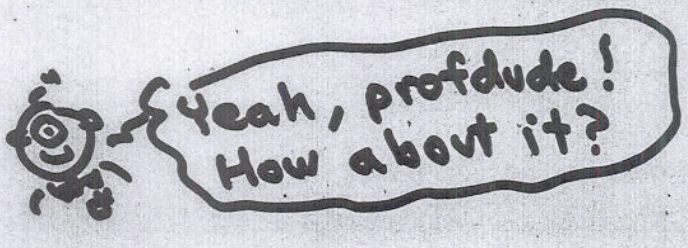


- What is the relationship between L, NL, P, etc?

- Are there NL-complete languages?



So. How About NL-completeness?



Def

A language Π is NL-complete if

1.

2.

Recall that...

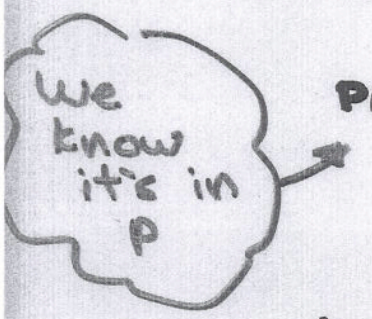
If any NP-complete language π is also in P then $P = NP$

Similarly, we claim that...

If any NL-complete language π is also in L then $L = NL$

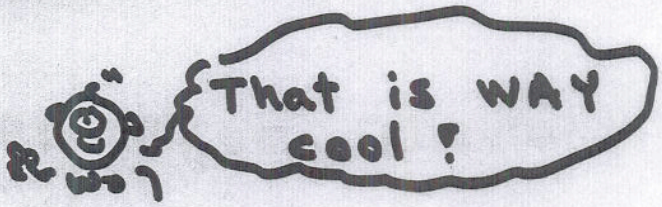
A Cook/Stockmeyer Type Theorem:

(Savitch, 1970)



PATH = $\{\langle G, s, t\rangle \mid G$ is a digraph and $\exists$ path from s to $t\}$

is NL-Complete.



Finally,

Claim: $L \subseteq NL = co\text{-}NL \subseteq P$