4 Space and Non-Determinism

Space

$space_M(w)$:= number of cells on working tapes a TM M steps into

$$SPACE(S) := \{L \subseteq \Sigma^* \mid \exists TM\ M : L(M) = L \text{ and } \forall w \in \Sigma^* \ space_M(w) \leq S(|w|)\}$$

$space_M(x) \leq time_M(x)$

$SPACE(S) \supseteq TIME(S)$

$PSPACE := SPACE(n^{O(1)})$

$\mathcal{L} := SPACE(\log n)$

input tape is read only, does not count

$REG = SPACE(O(1))$

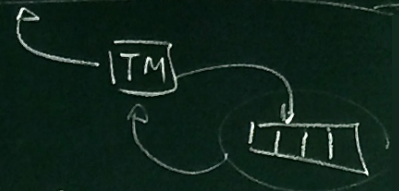
storing in the finite memory

$space_M(x) \leq time_M(x)$

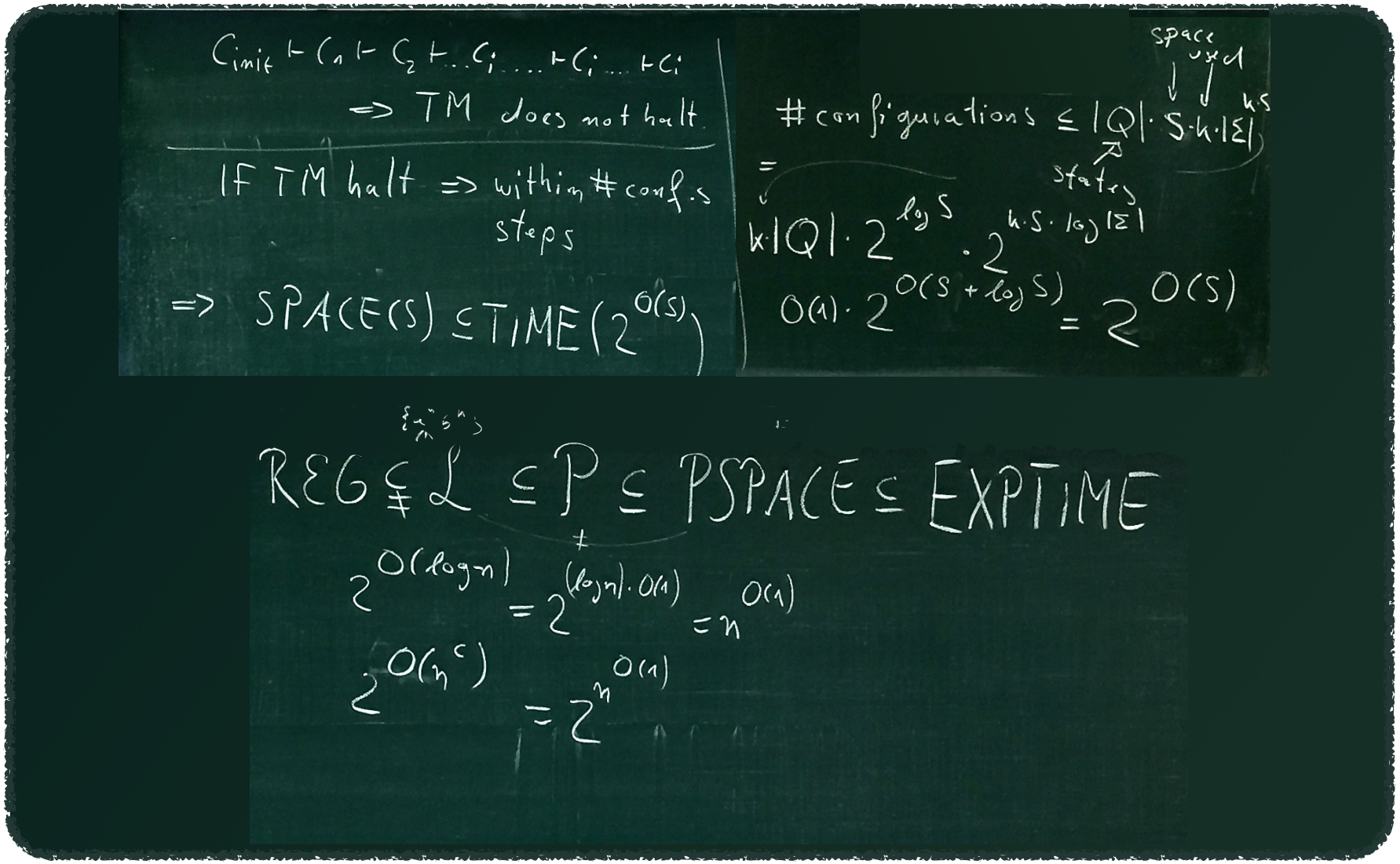
$SPACE(S) \supseteq TIME(S)$

READ ONLY

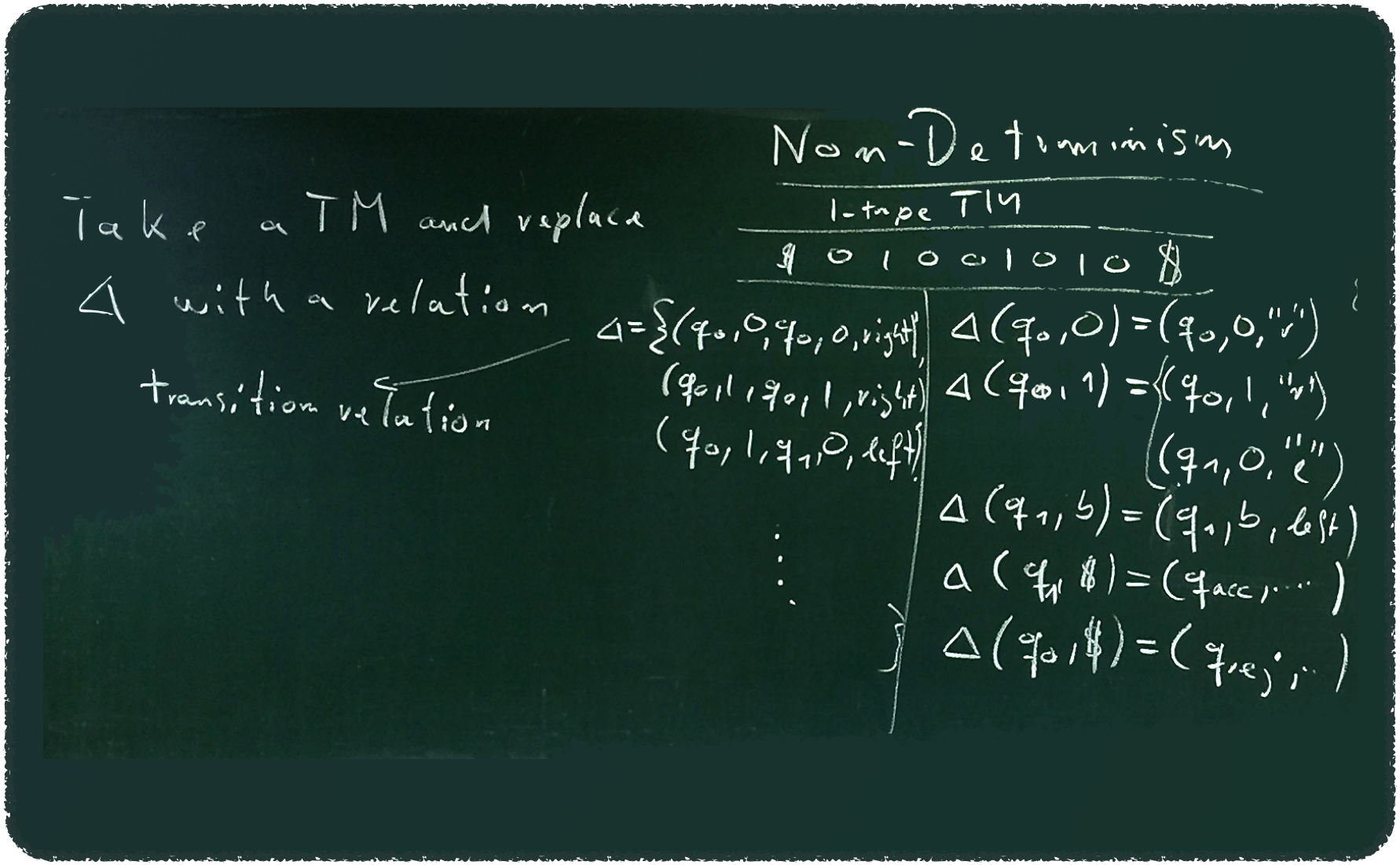
a a a a a a b b b b b b



4 Space and Non-Determinism



4 Space and Non-Determinism



4 Space and Non-Determinism

NTM: accepts if atleast one branch accepts.

$NTIME(T)$ $NP = NTIME(POL)$

co-NTM: accepts if all branches accept

co-$NTIME(T)$ co-NP = co-$NTIME(POL)$

$\oplus$-TM: accepts if the number of accepting branches is odd

$\oplus P = \oplus TIME(POL)$

Graphisomorphism $\in \oplus P$