W10L1 reductions

Monday, April 6, 2020 9:11

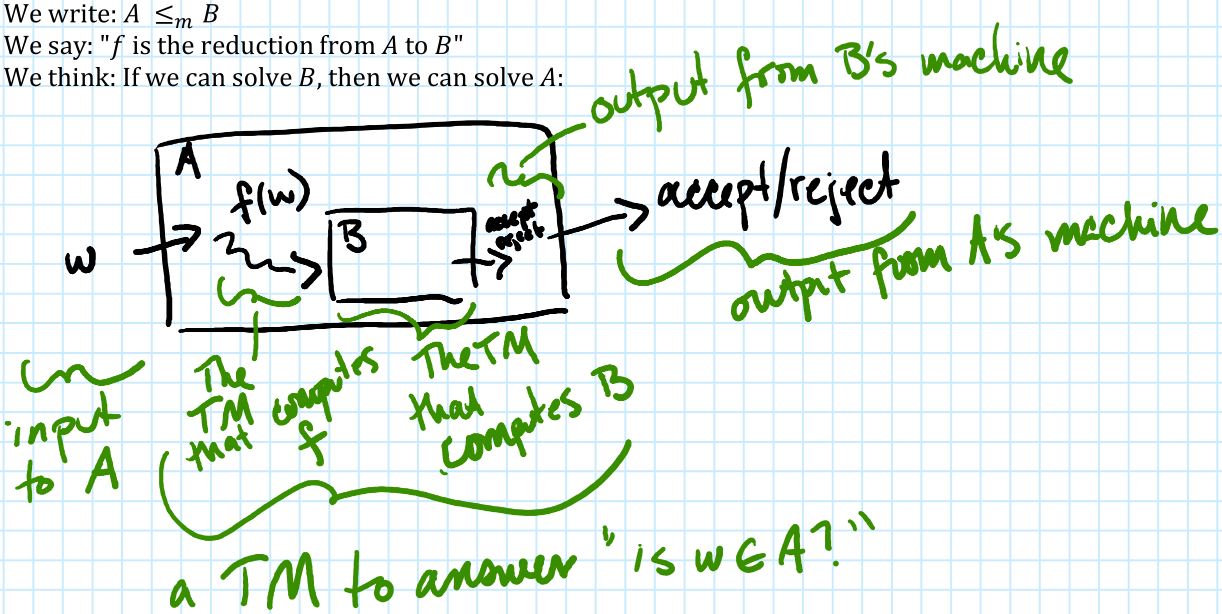
Announcements:

- quiz this week! you'll get an email and it will be announced on Piazza -- make sure you complete it by Friday
- pass-the-baton is back (modified)

Def: A function $f : \Sigma^* \to \Sigma^*$ is **computable** iff there is some Turing machine M which on every input w eventually halts with just $f(w)$ on the tape.

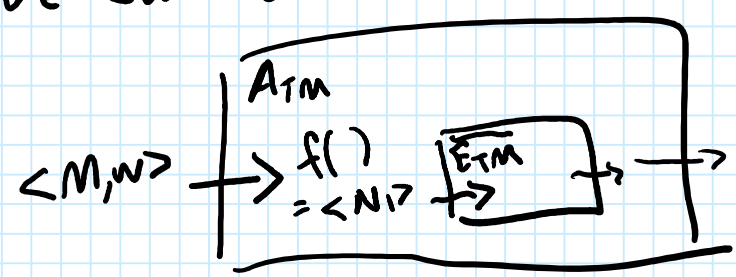
Def: For two languages A and B, we will say that A is **mapping-reducible** to B if there is a computable function f such that $\forall w, w \in A \Leftrightarrow f(w) \in B$.

We write: $A \leq_m B$
We say: "f is the reduction from A to B"
We think: If we can solve B, then we can solve A:

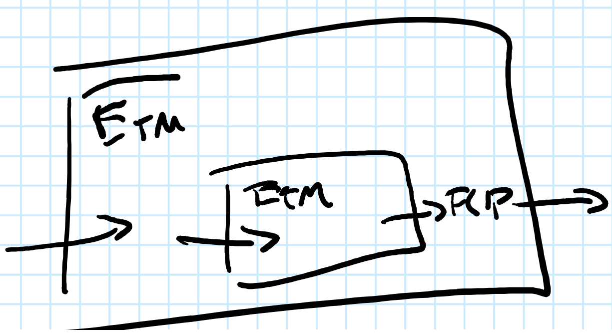


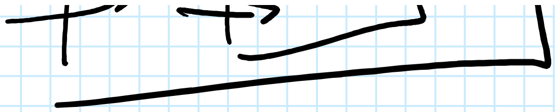
We showed:

$f(\langle M, w\rangle) = \langle N_1 \rangle$



$\langle M, w\rangle \in A_{TM}$
$\Longleftrightarrow \langle N_1 \rangle \notin E_{TM}$
$\Longleftrightarrow \langle N_1 \rangle \in \overline{E_{TM}}$





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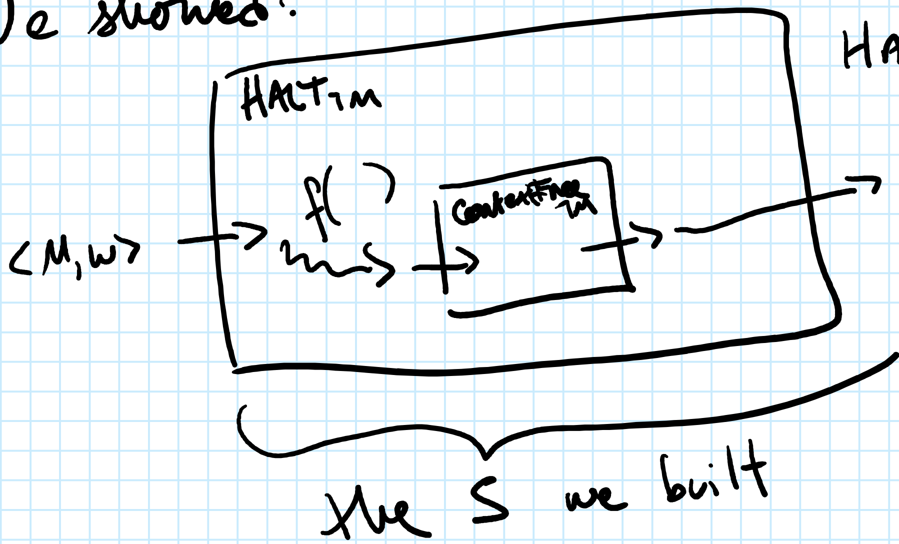

$HALT_{TM} \leq_m ContextFree_{TM}$

$f(\langle M,w\rangle) = \langle N_2\rangle$