$L = \{ \langle M, w \rangle \mid$ M is a TM that on input w will overwrite a 0 with a 1 over the course of computation $\}$.

$A_{TM} \leq_T L$

Can construct a decider for $A_{TM}$ by using an oracle for L.

On input $s = \langle M, w \rangle$

$\hat{M}$ = replace ~~all~~ transitions in M like so:

~~$s\ 0\ q\ 1\ m \rightarrow s\ 0$ reject~~

~~$s\ 0\ q\ 1\ m \rightarrow s\ 0\ q\ \hat{1}\ m$~~

replace all 1's with $\hat{1}$ ~~on~~ in input & in Machine transitions.

then ~~add~~ do the following:

~~$s\ t\ q_{accept}\ t_2\ m$~~

~~$\hookrightarrow s\ t\ q_{accept}$~~

$s\ 0\ \cancel{q_{accept}\ t_2\ m}$

$\downarrow$

~~$s\ 0$~~

replace the $q_{accept}$ transition to stay in place, and write $0 \rightarrow 1$.

Therefore, $\langle \hat{M}, \hat{w} \rangle$ will accept in L only if $\hat{M}$ accepts $\hat{w}$.

Run L on $\langle \hat{M}, \hat{w} \rangle$ & return result.

* $A_{TM} \leq_T L$, but $A_{TM}$ undecidable.

$\therefore$ L is undecidable.