Define $\text{ALL-in} = \Sigma < w > : L^*(w) = L$.

We've seen $A_{\text{in}} \leq_m \text{ALL-in}$ via $< (m, w) > \rightarrow M =\{1\}$, where $M =\{1\}$ accepts $w$ if $L^*(w) = L$.

$< (m, w) > \in M$ accepts $w$ if and only if $L^*(w)$ is regular.

`< (m, w) > \in M$ does not accept $w$.

Define the problem

IN: $A_{\text{in}} M$

OUT: Does $L(M)$ is regular?

Input $x$. If $x \in B$, accept $x$. Otherwise, reject $x$.

Pick $B = \Sigma^* \setminus \Sigma^1$. If $w \in B$, then $L(M)$ is not regular.

Edit the All-in Turing machine to make it $B$ or Nothing:

For $< (m, w) > \in M$, $L(w) = B \implies L(M)$ is not regular.

For $< (m, w) > \in M$, $L(w) = \emptyset$ as before, and $\emptyset$ is regular.