CPSC 351 — Tutorial Exercise #13
Hint for the Problem in This Exercise

1. Let $\text{Reject}_{\text{TM}} \subseteq \text{TM+I} \subseteq \Sigma_{\text{TM}}^{\star}$ be the set of encodings of Turing machines

   $$M = (Q, \Sigma, \Gamma, \delta, q_0, q_{\text{accept}}, q_{\text{reject}})$$

   and strings $\omega \in \Sigma^{\star}$ such that M ***rejects*** ω.

   You were asked to use a ***many-one reduction*** to prove that the language $\text{Reject}_{\text{TM}}$ i is undecidable.

   Hint: Let $M = (Q, \Sigma, \Gamma, \delta, q_0, q_{\text{accept}}, q_{\text{reject}})$ be a Turing machine. How could you make a *very simple* change, in order to produce another Turing machine

   $$\widehat{M} = (Q, \Sigma, \Gamma, \widehat{\delta}, q_0, q_{\text{accept}}, q_{\text{reject}})$$

   such that M rejects ω if and only if $\widehat{M}$ ***accepts*** ω, for *every* string $\omega \in \Sigma^{\star}$?

   Some of the changes that have been used, in other examples, are approximately as simple as the change that is needed here. Others are *more complicated* than the change that is needed here.