4.30 Let $A$ be a Turing-recognizable language consisting of descriptions of Turing machines, \{$(M_1, M_2), \ldots$\}, where every $M_i$ is a decider. Prove that some decidable language $D$ is not decided by any decider $M_i$ whose description appears in $A$. (Hint: You may find it helpful to consider an enumerator for $A$.)

- Given an example of a language $L$ such that $L$ is co-Turing recognizable but its complement is not.
- Prove that the language \{$< M, w, q > \mid M$ is a Turing machine which visits state $q$ during its execution when started with input string $w$\} is undecidable.
- Show that the set of undecidable languages are closed under complementation.

5.9 Let $T = \{(M) \mid M$ is a TM that accepts $w^R$ whenever it accepts $w$\}. Show that $T$ is undecidable.