CMPE 350 - Spring 2016

PS 11 - 11.05.16 & 13.03.16

4.20 Let A and B be two disjoint languages. Say that language C separates A and B if $A \subseteq C$ and $B \subseteq \bar{C}$. Show that any two disjoint co-Turing-recognizable languages are separable by some decidable language.

4.30 Let A be a Turing-recognizable language consisting of descriptions of Turing machines, $\{\langle M_1 \rangle, M_2 \rangle, \ldots\}$, 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.

• Prove: A language is Turing recognizable iff there exists an enumerator which enumerates it such that every string in the language appears only once in the listing.

• Disprove: Every countable language is decidable.