

Theory of Computing – Assignment 2

Read Chapter 3.

1. Show that for every infinite acceptable set S there is an infinite decidable set T with $T \subseteq S$.
2. Show that every infinite decidable set T there is a set S such that
 - $S \subseteq T$,
 - S is acceptable, and
 - S is not decidable.
3. Let A and B be acceptable sets such that $A \cup B = \Sigma^*$. Show there is a decidable set C such that $C \subseteq A$ and $C \cup B = \Sigma^*$.
4. For a language L define

$$S_L = \{0x \mid x \in L\} \cup \{1x \mid x \notin L\}.$$

Show that S_L is acceptable if and only if L is decidable. Use this fact to define a language B such that neither B nor \bar{B} is acceptable.