Quiz 12: Reducibility

CS 212 Nature of Computation

Habib University — Fall 2023

Total Marks: 10   Date: November 14, 2023
Duration: 15 minutes   Time: 830–845h

Student ID: _____

Student Name: _____

1. (10 points) We are given that the language A reduces to the language B. That is, a decider, R, for B can be used to make a decider, S, for A.

   Show that the language A' reduces to the language B'. That is, a decider, $R1$, for B' can be used to make a decider, $S1$, for A'.

   > **Solution:** We provide a proof by construction. We observe that $R1$ can be constructed from R by simply inverting the output of R. Similarly $S1$ can be constructed from S; R from $R1$; and S from $S1$.
   >
   > *Proof.* Construct $S1$ from $R1$ as follows:
   >
   > - Invert the output of $R1$ to obtain R.
   >
   > - Use R to construct S as given.
   >
   > - Output the inverse of S.
   >
   > □