CS 720, Fall 2016
Homework 6

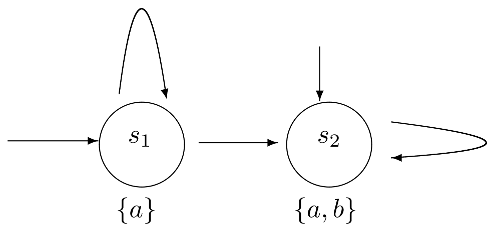
Due Date: October 26

1. Let $\mathcal{A}$ be the second NBA in Example 4.37 (i.e., the NBA in the upper right of Figure 4.13) and $\mathcal{A}'$ be the NBA in Figure 4.17 of the text.
   (a) Using the method from class, give a GNBA for $\mathcal{L}_\omega(\mathcal{A}) \cap \mathcal{L}_\omega(\mathcal{A}')$.
   (b) Using the method from class, convert the GNBA from Part (a) into an equivalent NBA.

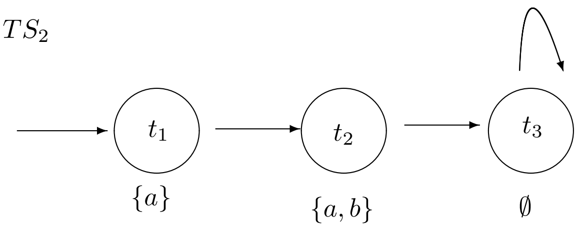
2. Prove that if L_1 and L_2 are ω-languages that can be recognized by DBAs, then $L_1 \cap L_2$ can also be recognized by a DBA. (In other words, prove that the languages recognizable by DBAs are closed under intersection.) [Hint: We have a two step method that transforms two NBAs $\mathcal{A}_1$ and $\mathcal{A}_2$ into an NBA $\mathcal{A}$ for $\mathcal{L}_\omega(\mathcal{A}_1) \cap \mathcal{L}_\omega(\mathcal{A}_2)$. (You applied this method in the previous problem.) You have to show that if $\mathcal{A}_1$ and $\mathcal{A}_2$ are DBAs, then $\mathcal{A}$ is also a DBA.]

3. Let $AP = \{a, b\}$ and ;et E be the LT property given in Problem 4 of Homework 3.
   (a) Give an NBA $\mathcal{A}$ such that $\mathcal{L}_\omega(\mathcal{A}) = (2^{AP}) \setminus E$.
   (b) For each of the following three transition systems TS_i for $i = 1, 2, 3$, construct the reachable part of product $TS_i \otimes \mathcal{A}$.

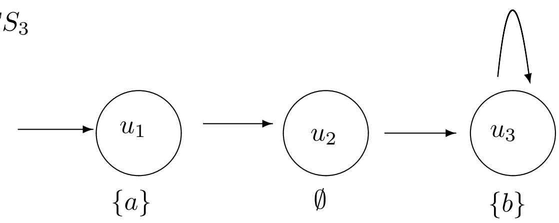
TS_1



TS_2



TS_3



(c) For each transition system TS_i use the product you constructed in the previous part to determine if the transition system satisfies the LT property E. You do not have to use the double depth first search algorithm. Just use the diagram of the product to explain your answer.