CSC341 HW2

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1 Academic Honesty

Written Sources Used: Michael Sipser - Introduction to the Theory of Computation

Help Obtained: None

2 Pointed DFAs

2.1 Problem 1

Yes, the definition of acceptance need to change for a DFA with $\perp$. While going through the input string if we encounter $\perp$, the input string needs to be rejected immediately since the existence of $\perp$ means system failure. Because of this reason, there needs to be a modification in the DFA.

2.2 Problem 2

2.2.1 (a)

For transformation from D to D$\perp$, we keep all transitions that exist in D, and for any transition that is undefined in D, we lead them to $\perp$ in D$\perp$.

2.2.2 (b)

Since D$\perp$ is D with additional $\perp$ which represents system failure, D$\perp$ can also follow the input strings that are accepted by D. D$\perp$ is just a copy of D that is made to detect additional failures.

2.2.3 (c)

Unlike part (a), we remove all transitions that lead to $\perp$ and $\perp$ itself, which makes all the transitions the same except for the transitions that utilize $\perp$.

2.2.4 (d)

If a regular language is accepted by D$\perp$, it means that the $\perp$ was not utilized in that regular language. If $\perp$ was not used then D$\perp$ and D are essentially the same. This leads to the fact that D can also accept A which is accepted by D$\perp$.