Introduction to the Theory of Computation
Homework #5

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1 Proof:

- Let $L = \{a^i b^j | i \neq j\}$ is regular.
- L is regular can not be the case.

□

2 Let x and y be strings and let L be any language. We say that x and y are distinguishable by L if some string z exists whereby exactly one of the strings xz and yz is a member of L; otherwise, for every string z, we have $xz \in L$ whenever $yz \in L$ and we say that x and y are indistinguishable by L. If x and y are indistinguishable by L we write $x \equiv_L y$. Show that $\equiv_L$ is an equivalence relation.

3

4 Minimize the DFA.

	1	2	3	4	5	6	7	8	9
1	-	-	-	-	-	-	-	-	-
2	x_1	-	-	-	-	-	-	-	-
3	x_1	x_1	-	-	-	-	-	-	-
4	x_1		x_1	-	-	-	-	-	-
5	x_0	x_0	x_0	x_0	-	-	-	-	-
6	x_0	x_0	x_0	x_0		-	-	-	-
7	x_1	x_1	x_1	x_1	x_0	x_0	-	-	-
8	x_1	x_1	x_1	x_1	x_0	x_0		-	-
9	x_0	x_0	x_0	x_0			x_0	x_0	-

5

(a)

(b) (c) (d)

6 Sipser 2.4(b): $\{w | w$ starts and ends with the same symbol$\}$

$R \rightarrow 0R \mid 1R \mid \epsilon$
$S \rightarrow 0 \mid 1 \mid 0R0 \mid 1R1$