

Assignment 1: Jan 13, 2025

Due Jan 20 midnight

Late submissions up to Jan 21 midnight 10% penalty.

Late submissions up to Jan 22 midnight 20% penalty.

No submissions accepted thereafter.

Two of the following will be marked & rewarded.

1. (8 marks) Give a DFA that recognizes the language

$\{w \in \{a,b\}^* \mid w \text{ does not contain } \text{bbabbb} \text{ as a substring}\}$

2. (8 marks) Give a NFA for

$\{w \in \{a,b\}^* \mid w \text{ either contains an even \# of a's}$
 $\text{or ends with } bbb \text{ (or both)}\}$

3. (8 marks) Use the construction (given in Thm 1.25)

to devise the DFA for the language $L_1 \cup L_2$

where: $L_1 = \{w \in \{0,1\}^* \mid w \text{ does not end in } 00\}$

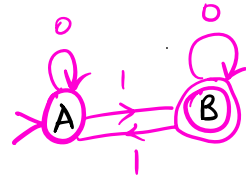
$L_2 = \{w \in \{0,1\}^* \mid \#_1(w) \text{ is odd}\}$

Hint:

"w does not end in 00"
(for you to do)



" $\#_1(w)$ is odd"



Solution:

4. (8 marks) Construct a DFA that recognizes

$$\{ w \in \{0,1\}^* \mid \#_0(w) - \#_1(w) \equiv 2 \pmod{3} \}$$

5. (8 marks) What language is recognized by the following DFA? Give a formal defⁿ.

