

Homework 3 (Due May 3, 2016, 13:00)

BLM 2502: Theory of Computations — Spring 2016

Print family (or last) name: _____

Print given (or first) name: _____

Print given student number: _____

I see that this homework has 5 questions in total.

I agree that I have to submit my homework solution before the deadline (May 3, 2016, 13:00) otherwise my homework solution will not be graded.

I accept that ***I will add the signed version of this instruction page as a first page into my homework solution***; otherwise my homework solution will not be graded.

I know that ***I have to give my solutions written on white A4-sized pages that are stapled on the left-up corner***; otherwise my homework solution will not be graded.

I will take care of the readability of my solutions, from which I may lose 10 points.

For any proofs, I am sure to provide a step-by-step argument, with justifications for every step.

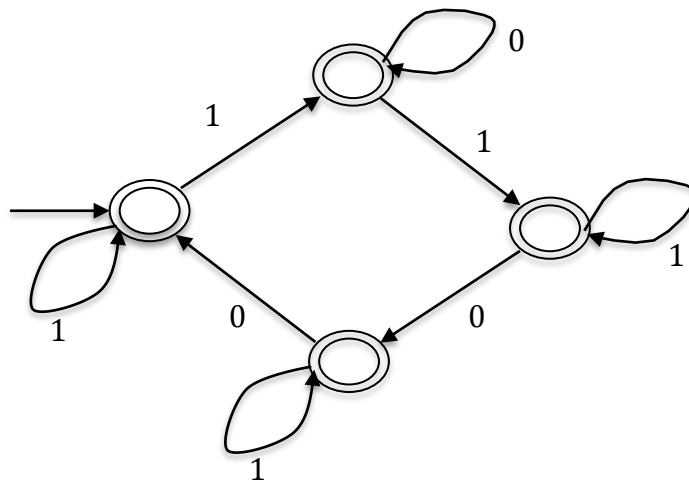
I understand that, during solving this homework, it is prohibited to exchange information about solutions with any other person in any way, including by talking or ex-changing solutions / papers.

I know that the course book is “Introduction to the theory of computation, 2nd Ed., Massachusetts Institute of Technology, by Micheal Sipser.”

I have read, understand and accept all of the instructions above. On my honor, I pledge that I have not violated the provisions of the Academic Integrity Code of Yıldız Technical University.

Signature and Date

- 1) **[10 points]** Answer the following questions.
 - a) What is palindrome? What is lexicographic order? Give your explanation by exemplifying them for the alphabet $\Sigma = \{a, b\}$.
 - b) What is Chomsky normal form? Explain.
- 2) **[30 points]** For the alphabet $\Sigma_1 = \{0,1\}$, answer the following questions for the automata machine shown below
 - a) Is the machine DFA or NFA?
 - b) Give its regular expression.
 - c) Give a context-free grammar that generates the same language. Is your grammar ambiguous? Why or why not?



- 3) **[30 points]** For the alphabet $\Sigma_1 = \{0,1\}$, answer the following questions?
 - a) Show whether $L_1 = \{0^n 1^n 0^m \mid n \geq 0 \text{ and } m \geq 0\}$ is a context-free language?
 - b) Show whether $L_2 = \{0^m 0^n 1^n \mid n \geq 0 \text{ and } m \geq 0\}$ is a context-free language?
 - c) Not only using results obtained for the languages L_1 and L_2 above but also exploiting the pumping lemma for context free languages, show whether or not the following languages are context-free languages.
 - i. $L = L_1 \cup L_2$
 - ii. $L = L_1 \cap L_2$
- 4) **[15 points]** Problem 2.9 within the course book.
- 5) **[15 points]** Problem 2.14 within the course book.