

CSCE 222 [Sections 502, 503] Discrete Structures for Computing
Spring 2017 – Hyunyoung Lee

Problem Set 10

Due dates: Electronic submission of *yourLastName-yourFirstName-hw10.tex* and *yourLastName-yourFirstName-hw10.pdf* files of this homework is due on **Tuesday, 5/2/2017 before the beginning of class** on <http://ecampus.tamu.edu>. You will see two separate links to turn in the .tex file and the .pdf file separately. Please do not archive or compress the files. A signed paper copy of the pdf file is due on **Tuesday, 5/2/2017** at the beginning of class. **If any of the three submissions are missing, your work will not be graded. Late submissions of any form will not be accepted.**

Name: Joseph Martinsen

Section: 503

Resources. (All people, books, articles, web pages, etc. that have been consulted when producing your answers to this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: _____

In this problem set, you will earn total $100 + 5$ (extra credit) points.

Problem 1. (10 points) Section 13.1, Exercise 4, page 856

Solution.

1.

$$\begin{aligned} S &\rightarrow 1S \\ &\rightarrow 11S \\ &\rightarrow 11100S \\ &\rightarrow 111000 \end{aligned}$$

2. 111001 does not belong in the language because the only production that terminates with a terminal is $S \rightarrow 0$ which results in every member in the language must end with 0, which 111001 does not.

3.

$$L(G) = \{1^n 0^m \mid n \geq 0, m \geq 3\}$$

Problem 2. (10 points) Section 13.1, Exercise 6 a), b), c), and d), page 856

Solution.

a)

$$L(G) = \{abbb\}$$

b)

$$L(G) = \{aba, aa\}$$

c)

$$L(G) = \{abb, abab\}$$

d)

$$L(G) = \{a^{2n} | n \geq 2\} \cup \{b^n | n \geq 1\}$$

Problem 3. (16 points) Section 13.1, Exercise 14, page 856

Solution.

1.

$$\begin{aligned} G &= (V, T, S, P) \\ V &= \{0, 1, S\} \\ T &= \{0, 1\} \\ P &= \{S \rightarrow 10, S \rightarrow 01, S \rightarrow 101\} \end{aligned}$$

2.

$$\begin{aligned} G &= (V, T, S, P) \\ V &= \{0, 1, A, S\} \\ T &= \{0, 1\} \\ P &= \{S \rightarrow 00A1, A \rightarrow AA, A \rightarrow 0, A \rightarrow 1\} \end{aligned}$$

3.

$$\begin{aligned} G &= (V, T, S, P) \\ V &= \{0, 1, A, B, S\} \\ T &= \{0, 1\} \\ P &= \{S \rightarrow A0, B \rightarrow \lambda, A \rightarrow 11B, A \rightarrow 1B1, A \rightarrow B11, B \rightarrow 0B\}^* \end{aligned}$$

*0 is not even because you can not divide up 0 objects into two groups

4.

$$\begin{aligned}G &= (V, T, S, P) \\V &= \{0, 1, A, B, S\} \\T &= \{0, 1\} \\P &= \{S \rightarrow AB, A \rightarrow B0, B \rightarrow A1, A \rightarrow \lambda, B \rightarrow \lambda\}\end{aligned}$$

Problem 4. (12 points) Section 13.1, Exercise 18, page 856

Solution.

1.

$$\begin{aligned}G &= (V, T, S, P) \\V &= \{0, 1, A, S\} \\T &= \{0, 1\} \\P &= \{S \rightarrow 0A, A \rightarrow 11A, A \rightarrow \lambda\}\end{aligned}$$

2.

$$\begin{aligned}G &= (V, T, S, P) \\V &= \{0, 1, S\} \\T &= \{0, 1\} \\P &= \{S \rightarrow 0S11, S \rightarrow \lambda\}\end{aligned}$$

3.

$$\begin{aligned}G &= (V, T, S, P) \\V &= \{0, 1, A, S\} \\T &= \{0, 1\} \\P &= \{S \rightarrow 0S0, S \rightarrow A, S \rightarrow \lambda, A \rightarrow \lambda, A \rightarrow 1A\}\end{aligned}$$

Problem 5. (10 points) Section 13.1, Exercise 24, page 857

Solution.

Problem 6. (6 points) Section 13.2, Exercise 2 a), page 864

Solution.

Problem 7. (6 points) Section 13.2, Exercise 4, page 864

Solution.

Problem 8. (12 points) Section 13.3, Exercise 8, page 875

Solution.

Problem 9. (12 points) Section 13.3, Exercise 10, page 875

Solution.

Problem 10. (5 points) Section 13.3, Exercise 16, page 876

Solution.

Problem 11. (6 points) Section 13.3, Exercise 28, page 876

Solution.

Checklist:

- ☐ Did you type in your name and section?
- ☐ Did you disclose all resources that you have used?
(This includes all people, books, websites, etc. that you have consulted)
- ☐ Did you sign that you followed the Aggie honor code?
- ☐ Did you solve all problems?
- ☐ Did you submit both the .tex and .pdf files of your homework separately to the correct link on eCampus?
- ☐ Did you submit a signed hardcopy of the pdf file in class?