Assignment 7

Dr. William M. Farmer

McMaster University

Revised: March 5, 2020

Assignment 7 consists of two problems. You must write your solutions to the problems using LaTeX.

Please submit Assignment 7 as two files, `Assignment_7_YourMacID`.tex and `Assignment_7_YourMacID`.pdf, to the Assignment 7 folder on Avenue under Assessments/Assignments. *YourMacID* must be your personal MacID (written without capitalization). The `Assignment_7_YourMacID`.tex file is a copy of the LaTeX source file for this assignment (`Assignment_7`.tex found on Avenue under Contents/Assignments) with your solution entered after each problem. The `Assignment_7_YourMacID`.pdf is the PDF output produced by executing

```
pdflatex Assignment_7_YourMacID
```

This assignment is due **Sunday, March 15, 2020 before midnight.** You are allow to submit the assignment multiple times, but only the last submission will be marked. **Late submissions and files that are not named exactly as specified above will not be accepted!** It is suggested that you submit your preliminary `Assignment_7_YourMacID`.tex and `Assignment_7_YourMacID`.pdf files well before the deadline so that your mark is not zero if, e.g., your computer fails at 11:50 PM on March 15.

Although you are allowed to receive help from the instructional staff and other students, your submission must be your own work. Copying will be treated as academic dishonesty! If any of the ideas used in your submission were obtained from other students or sources outside of the lectures and tutorials, you must acknowledge where or from whom these ideas were obtained.

Problems

1. [**10 points**] Let Σ be the set of lower and uppercase letters in the Roman alphabet plus the hyphen symbol "-". Let a *simple English word* be a nonempty string $x \in \Sigma^*$ such that:

   a. An uppercase letter can only occur as the first symbol in x.

   b. A hyphen cannot occur as either the first or the last symbol in x.

   c. Two hyphens cannot occur in a row.

   Write a regular expression that matches the set of simple English words (as defined above).

   Name: Hishmat Salehi
   MacId: Salehh6
   Date: March 15, 2020

   Solution for Problem 1:

   $$(A + B + \cdots + Y + Z + a + b + \cdots + y + z)((a + b + \cdots + y + z)^*(\epsilon + \text{-})(a + b + \cdots + y + z)^*)^*$$

2. [**10 points**] Construct an NFA (possibly with ϵ-transitions) that is equivalent to the regular expression

   $$01((10)^* + 11)^*.$$

   Present the NFA as both a transition table (with a column for ϵ transitions) and a transition diagram.

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   Transition table:

Q \ Σ	0	1	ϵ
start $\to$ q_0	$\{q_1\}$	$\{\}$	$\{\}$
q_1	$\{\}$	$\{q_2\}$	$\{\}$
q_2	$\{\}$	$\{\}$	$\{q_3, q_8, q_{11}\}$
q_3	$\{\}$	$\{\}$	$\{q_4, q_7\}$
q_4	$\{\}$	$\{q_5\}$	$\{\}$
q_5	$\{q_6\}$	$\{\}$	$\{\}$
q_6	$\{\}$	$\{\}$	$\{q_7\}$
q_7	$\{\}$	$\{\}$	$\{q_4, q_{11}\}$
q_8	$\{\}$	$\{q_9\}$	$\{\}$
q_9	$\{\}$	$\{q_{10}\}$	$\{\}$
q_{10}	$\{\}$	$\{\}$	$\{q_{11}\}$
final $\to$ q_{11}	$\{\}$	$\{\}$	$\{q_2\}$

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