WORKSHEET 7

MATH2301, SEMESTER 2, 2021

INSTRUCTOR: ASILATA BAPAT

(1) If r is a regular expression, write down another regular expression s such that

$$L(s) = \{vwx \mid v, w, x \in L(r)\}.$$

(2) Write down a regular expression whose language is

$$\{w \in \Sigma^* \mid w \text{ is any string except 0 or 1}\}.$$

(3) Write down a regular expression r that matches exactly those binary strings that are divisible by 8 when converted to a decimal. (Let us assume that we only consider a binary string to represent a valid number if it either starts with a 1, or if the whole string equals 0.)

(4) Let $r = 01^*0|10^*1$. Describe $L(r)$ in words.

(5) Write down a regular expression for the language that contains exactly those strings without two consecutive 1s. Discuss and convince each other that you haven't missed anything or have anything extra.

(6) Write down a regular expression whose language is

$$\{w \in \Sigma^* \mid w \text{ has exactly two 0s and at least two 1s}\}.$$

Discuss and convince each other that you haven't missed anything or have anything extra.

(7) For each of the problems 2, 3, and 4, try to come up with regular expressions that match precisely the strings that do not match the regular expression from the problem. You can either try to do this directly based on the descriptions of the language, or try to do it by manipulating the regular expressions. Can you find a systematic method for this?

Date: September 26, 2021.