

Math 6010 - Assignment 1

Due January 25, 2021

- (1) Construct a deterministic finite automaton over $\Sigma := \{0, 1\}$ that accepts all positive multiples of 3 in binary (that is, all strings starting in 1 that represent a positive integer divisible by 3).
- (2) (a) [1, Exercise 3.1.1 a] Give a regular expression for the language over $\{a, b, c\}$ containing at least one a and one b .
(b) Give a regular expression for the language of words over $\{0, 1\}$ in which the number of 0s is a multiple of 3.
- (3) [1, Exercise 4.1.2 a] Show that $\{1^{n^2} \mid n \in \mathbb{N}\}$ is not a regular language.
- (4) Show that the class of regular languages on an alphabet Σ is closed under complementation, union, intersection, concatenation, and Kleene star *.
(Hint: Use the characterization of regular languages by automata whenever convenient.)

REFERENCES

- [1] Hopcroft, John; Motwani, Rajeev; Ullman, Jeffrey. Introduction to automata theory, languages, and computation. Pearson, 3rd edition, 2006.