

CIS 511: Spring 2015

Midterm Practice Problems

Some problems are harder than exam problems, but solving them will sharpen your thinking and help you tackle the exam questions better. Solutions, perhaps to a subset of the problems, will be posted prior to the review session. For best results please make a serious attempt to solve these problems before seeing the solutions.

1. Let L be a regular language. Which of the following are regular? Justify your answers.

(a) $\text{CYCLE}(L) = \{uv \mid vu \in L \text{ for strings } u \text{ and } v\}$.

(b) $\text{MAX}(L) = \{x \in L \mid \text{for no } y \text{ other than } \epsilon \text{ is } xy \in L\}$.

(c) $\frac{1}{2}(L) = \{x \mid \exists y : |y| = |x| \text{ and } xy \in L\}$.

2. Problem 1.47

3. Problem 1.49

4. Problem 1.64

5. Which of the following are CFL's? Prove your answers

(a) $\{x\#y \mid x, y \in \{0, 1\}^* \text{ and } x \neq y\}$

(b) $\{ww^Rw \mid w \in \{0, 1\}^*\}$

(c) $\{wxw \mid w, x \in \{0, 1\}^*\}$

(d) $\{a^ib^j \mid i = kj \text{ for some positive integer } k\}$

6. Problem 2.43

7. Problem 3.11

8. Problem 3.18

9. Problem 3.19

10. Problem 4.10

11. Problem 4.26