

CIT 596 Homework 5

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1 Exercise 2.31

Let B be the language of all palindromes over $\{0, 1\}$ containing an equal number of 0s and 1s. Show that B is not context free.

TODO

2 Exercise 2.36

Give an example of a language that is not context free but that acts like a CFL in the pumping lemma. Prove that your example works.

TODO

3 Exercise 1.54

Consider the language $F = \{a^i b^j c^k \mid i, j, k \geq 0 \text{ and if } i = 1 \text{ then } j = k\}$.

3.1 Part a

Show that F is not regular.

TODO

3.2 Part b

Show that F acts like a regular language in the pumping lemma. In other words, give a pumping length p and show that F satisfies the three conditions of the pumping lemma for this value of p .

TODO

3.3 Part c

Explain why parts a and b do not contradict the pumping lemma.

TODO

4 Exercise 2.40

Say that a language is prefix-closed if the prefix of any string in the language is also in the language. Let C be an infinite, prefix-closed, context-free language. Show that C contains an infinite regular subset.

TODO

5 Exercise 2.44

If A and B are languages, define $A \diamond B = \{xy \mid x \in A \text{ and } y \in B \text{ and } |x| = |y|\}$. Show that if A and B are regular languages, then $A \diamond B$ is a CFL.

TODO

6 Exercise 3.1d

TODO

7 Exercise 3.2e

TODO

8 Exercise 3.9

TODO

9 Exercise 3.13

TODO

10 Exercise 3.15

TODO

11 Exercise 3.16b

TODO

12 Exercise 4.15

TODO

13 Exercise 4.16

TODO

14 Exercise 4.19

TODO

15 Exercise 3.3

TODO – see note in homework assignment

16 Exercise 2.20a

TODO – see note in homework assignment

17 Exercise 2.20b

TODO – see note in homework assignment