Ars Digita University
Theory of Computation
Recitation 6, 05/10/01

Topics

- Rigorous proofs using the pumping lemma.
- More constructions with context free grammars.
- Chomsky Normal Form.

Problems to work on

1. Finish working on the CFG problems from the lst handout.
2. (Warmup). Generate the grammar for 0*1(0+1)*.
3. Using the grammar above, What are the leftmost and rightmost derivation for the strings 1001, 0011? What are the parse trees?
4. (Text 2.13) Consider the following grammar.

```
S --> TT | U
T --> 0T | T0 | 1
U --> 0U00 | 1
```

   Describe the language it generates.

Chomsky Normal Form

5. Put the following grammar in Chomsky Normal form. (Text 2.14)

```
A --> BAB | B | epsilon
B --> 00 | espilon
```

6. Put the following grammar in Chomsky Normal form.

```
A --> BAB | B | BC
B --> 00 | epsilon
C --> AA
```

Rigorous pumping lemma proofs

Problems from previous handouts kindly reproduced here. Rigorously prove using the pumping lemma.

7. Prove that the language { x^{2^n} | n >= 0 } is not regular.
8. Show that the set of all strings of zeros that have length that is a perfect cube can not

be described by a regular expression.

Dimitri Kountourogiannis, dimitrik@alum.mit.edu