CSE216
Programming Abstraction

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Credits:
https://pages.cs.wisc.edu/~aanjneya/courses/cs154/lectures/lec6.pdf

Exercises:
Context-Free Grammar

Exercise 1

- Construct a parse tree for 000111 for this grammar:

$$S \rightarrow 01$$

$$S \rightarrow 0S1$$

Exercise 2

- Construct a parse tree for (())() for this grammar:

$$S \rightarrow SS \mid (S) \mid ()$$

Exercise 3

Given the grammar G with the following productions:

- $S \to aSb$
- $S \to \epsilon$

Determine the language $L(G)$ generated by G.

Exercise 4

Given the grammar G with the productions:

- $S \to aSa$
- $S \to bSb$
- $S \to \epsilon$

What is the language $L(G)$?

Exercise 5

Consider the grammar G defined as:

- $S \to aS$
- $S \to Sb$
- $S \to \epsilon$

Define the language $L(G)$.

Exercise 6

Create a grammar that generates the language of all strings of the form:

- a language containing only the words "dog", "cat", and “fish”.

Exercise 7

Create a grammar that generates the language of all strings of the form:

- "a^n", where n ≥ 0.

Exercise 8

Create a grammar that generates the language of all strings of the form:

- "a^n b^m", where n, m ≥ 0.

Exercise 9

Create a grammar that generates the language of all strings of the form:

- "a^n b^n", where n ≥ 0.

Exercise 10

Create a grammar that generates the language of all strings of the form:

- all strings over {a, b} that start with 'a' and end with 'b'.

Exercise 11

- Create a grammar that generates all valid sequences of balanced parentheses, e.g., "", "()", "(())", "()()", but not "(()", ")(", or "())(".