COMS W4115
Programming Languages and Translators
Lecture 14: Midterm Review
March 11, 2013

1. What you should know for the midterm

1. The different kinds of programming languages
- Lecture 1
- The fundamental elements of programming languages
- Lecture 2, ALSU Ch.1
- Language processing tools
- Lecture 2, ALSU Ch. 1
- The structure of a compiler
- Lecture 3, ALSU Chs. 1 and 2
- Regular languages, regular expressions, finite automata
- Lectures 4 and 5, ALSU Ch. 3 except for Sect. 3.9
- Lexical analysis
- Lectures 4 and 5, ALSU Chs. 2 and 3 except for Sect. 3.9
- Context-free languages and grammars
- Lectures 6 and 7, ALSU Ch. 4 except for Sect. 4.7
- Top-down parsing
- Lecture 9, ALSU Chs. 2 and 4 except for Sect. 4.7
- Bottom-up parsing
- Lectures 10 and 11, ALSU Ch. 4 except for Sect. 4.7
- Syntax-directed translation
- Lectures 12 and 13, ALSU Chs. 2 and Ch. 5 except for Sect. 5.5

2. Automata and Language Theory Review

- Regular languages
  - Finite automata
  - Regular expressions
  - Closure properties of regular languages
  - Decision properties of regular languages
  - Pumping lemma for regular languages and its uses
- Context-free languages
  - Context-free grammars
  - Parse trees, derivations, and ambiguity
  - Pushdown automata and deterministic pushdown automata
  - Closure properties of CFLs
  - Decision properties of CFLs
  - Pumping lemma for CFLs and its uses
- Syntax-directed translation
  - Syntax-directed definitions and translation schemes
  - Attribute grammars, inherited and synthesized attributes
  - S-attributed and L-attributed SDDs

3. Not all LL(1) grammars are SLR(1) and vice versa

- An LL(1) grammar that is not SLR(1)

```
S â†’ AaAb | BbBa
A â†’ Îµ
B â†’ Îµ
```

- An SLR(1) grammar that is not LL(1)

```
S â†’ SA | A
```

A â†’ a

aho@cs.columbia.edu