

## Homework 5

**Due: 2014.12.18 midnight**

**Problem 1** Write a context-free grammar for the language  $\{a^n b^i c^j d^{2n} \mid n \geq 1, i \neq j\}$ .

**Problem 2** Write a context-free grammar that generates arithmetic expressions having variables from the set  $\{x, y, z\}$  and constants from the set  $\{0, 1, 2\}$ . To simplify grading for variables use  $E$  for expression,  $T$  for term,  $F$  for factor.

**Problem 3** Write a context-free grammar for the complement with respect to  $\{a, b, c\}^*$  of the language  $\{wcw \mid w \in \{a, b\}^*\}$ .