Homework 3
Spring 2013 Programming Language Constructs
Lecturer: Chi-Jen Wu (cjwu @ iis.sinica.edu.tw)
TA: Yi-Chan Kao (dogkevin @ hotmail.com)

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Due: 5/09/13

This assignment is a handwritten homework.

1 Problems

Task 1. Consider the following BNF grammar:

\[
S \rightarrow ACB \\
A \rightarrow BC|BaA \\
B \rightarrow bC \\
C \rightarrow Cb|Cc|\varepsilon
\]

Please complete the FIRST set for each symbol.

(1) S
(2) A
(3) B
(4) C

Task 2. Please construct an equivalent BNF grammar which is unambiguous.

\[
S \rightarrow SS|a|b
\]

Task 3. What is LL parser? and its problem? What is LR parser?

Task 4. Please name the three principle memory allocation classes and briefly describe the corresponding object lifetimes.

Task 5. Please explain what is garbage collection in programming languages. Then please describe two common garbage collection techniques.

Task 6. Give an example in C or C++ of the dangling-pointer problem. Give two approaches can remove the dangling-pointer problem.