CS 1621 Concepts of Programming Languages

Fall 2017

Homework 4 (100 points)

Due time: 2:30pm 11/7/2017

(Homework answers should be typed, or clearly hand-written. Please print your name on the paper copy).

1. (10 points) Why is generational garbage collection better than semi-space garbage collection?

2. (20 points) Define the following terminology.

    a. Operator precedence;
    b. Operator associativity;
    c. Functional side effect;
    d. Guarded selection-statement.

3. (10 points) What is short-circuit evaluation? And, discuss the problem if we let the compiler, instead of the language, decide if short-circuit is allowed or not.

4. (10 points) Consider the following C program.

```
int fun(int *i) {
    *i += 5;
    return 4;
}
void main() {
    int x = 3;
    x = x + func(&x);
}
```

   What is the value of x after the assignment statement in main(), assuming
   (a) operands are evaluated from left to right;
   (b) operands are evaluated from right to left.

5. (10 points) Given the following loop,

```
i = 1; while (i<= 10)  { i++; }
```

   Please rewrite the loop using different loop structures.
   (a) do S while B; // while Boolean expression B is true, repeat statement S
   (b) repeat S until B; // exit the loop if B is evaluated to be true

6. (10 points) Rewrite the following pseudocode using a loop structure in two languages: (a) C, or C++, or Java; (b) Python.

```
        k = (j + 13) / 27
 loop:
        if (k>10) then goto   out;
        k = k + 1
        I = 3 * k - 1
        goto loop;
 out:
```

   Assume all variables are integer type. Compare the writability and readability.

7. (30 points) Read the following slides (page 1-32) or the original article of the paper.
   Briefly summarize the pros and cons of GOTO statement in **two** paragraphs (**shorter than ½ page**).
   Slides: http://people.cs.pitt.edu/~zhangyt/teaching/cs1621/goto.slides.pdf
   The article: http://people.cs.pitt.edu/~zhangyt/teaching/cs1621/goto.paper.pdf