Chapter 7 – Expressions and Assignment Statements

1) What are the main issues of expression semantics? Give four.
2) In programming languages, arithmetic expressions consist of four items. Name them.
3) An implementation of an arithmetic computation must cause two actions. What are those?
4) Given the following operators in C:

   ~, ++, ||, ?:, *=, &, <<, %, >, ->, ^, ==

   a. Arrange the operators from highest to lowest precedence.

   b. Identify the associativity of each operator.
5) Discuss a situation in which integer addition on a computer is:

   a. not commutative. b. not associative.
6) Refer to code fragment A, determine the output after execution of `noel()`.
7) What are two possible solutions to the problem of operand evaluation order and side effects?
8) a. What is referential transparency?

   b. Illustrate an example of a C program that connects referential transparency and functional side effects.
9) Discuss the safety issues of each kind of type conversions.
10) Discuss three errors in expressions.
11) Refer to code fragment B, determine the output.
12) Refer to code fragment C, determine the output.
13) Explain how the coercion rules of a language affect its error detection.
14) Discuss an issue of operator overloading.
15) Write a C code fragment that illustrates all the possible short circuit evaluation scenarios.

A.
```c
#include<stdio.h>
int a;
int noel() {
    a = 17;
    return 3;
}
void main() {
    a = 5;
    a = a + noel() + a;
    printf("%d",a);
}
```

B.
```c
#include<stdio.h>
void main() {
    int chiz = 5, khent = 4, ean = 3;
    printf("%d",chiz>khent>ean);
}
```

C.
```c
#include<stdio.h>
void main() {
    int woogue = 69;
    printf("%d,",++woogue);
    printf("%d,%d,%d",woogue++,++woogue,-woogue--);
}
```

Chapter 8 – Statement-Level Control Structures

16) Define the following: a. control statements b. control structures
17) Why are multiple exits from control structures not considered a design issue?
18) What are the differences of C#'s switch implementation and that of C?
19) Derive an operational semantics description using goto and labels for the following with with three different branches: a. switch statement b. nested if statement
20) Derive an operational semantics description using goto and labels for code fragment D.
21) What do the following in Python return?

    a. range(5) b. range(30,20) c. range(0,9,3)
22) What are the issues in goto statements and state a suggested remedy in resolving such issues?
23) What are guarded commands?
24) Describe three specific programming situations that require a posttest loop.
25) Rewrite the pseudocode segment E using a loop structure in Python.

D.
```c
for (count1 = 0, count2 = 1.0;
     count1 <= 10 && count2 <= 100.0;
     sum = ++count1 + count2, count2 *= 2.5);
```

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