Programming Assignment 2

1. Augment your T parser with semantic actions for constructing parse trees, write a C code generator and make it a workable T-to-C compiler.
   - See an attached package for the reference files.
   - You are requested to separate the C code, the Lex specification, the Yacc specification into distinct files.

Guideline:

1. You have to demonstrate your program in person and have the report in paper with you.
2. You may get up to 10% bonus if you succeed in each of the following conditions:
   - Redesign the overall data structures for parse trees.
   - Rewrite all pieces of the C code generator.
   - Implement a type analyzer for the T Compiler.

   And, up to 10% penalty will be given for lateness. More precisely, if you get X in demonstration, and Y for the report:
   - ($6/8^{th}$ or 10^{th}) Your score = (X * 70%) * 110% + Y * 30%
   - ($6/22^{nd}$ or 24^{th}) Your score = X * 70% + Y * 30%
   - (Late) Your score = (X * 70% + Y * 30%) * 90%
3. Your report has to include the following elements:
   I. A cover page.
   II. The problem description.
   III. Highlight of the way you write the program.
   IV. The program listing.
   V. Test run results.
   VI. Discussion.

A Sample Input Program

```
/* This is a comment line in the sample program. */
INT f2 ( INT x, INT y )
BEGIN
    INT z;
    z := x*x - y*y;
    RETURN z;
END

INT MAIN f1 ()
BEGIN
    INT x;
    READ(x, "Please input an integer number x: ");
    INT y;
    READ(y, "Please input another integer number y: ");
    INT z;
    z := f2(x, y) + f2(y, x);
    WRITE(z, "f2(x, y) + f2(y, x) = ");
END
```

A Sample Generated C Code

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
void tiny_readint ( int *x, char *s ) {
  printf("%s ", s);
  scanf("%d", x);
}
void tiny_writeint ( int x, char *s ) {
  printf("%s ", s);
  printf("%d\n", x);
}
int f2 ( int x, int y)
{ int z;
z = x * x - y * y;
return z;
}
int main ( )
{ int x;
tiny_readint(&x,"A41.input");
int y;
tiny_readint(&y,"A42.input");
int z;
z = f2(x, y) + f2(y, x);
tiny_writeint(z, "A4.output");
}
```