Data Structure Assignment 1

Paper Homework

(textbook p.41)

1. Show that the following statements are correct:
   (a) $5n^2 - 6n = \Theta(n^2)$
   (d) $\sum_{i=0}^{n} i^2 = \Theta(n^3)$
   (f) $n^{2^n} + 6 * 2^n = \Theta(n^{2^n})$
   (k) $10n^3 + 15n^4 + 100n^2 2^n = O(n^2 2^n)$

2. Show that the following statements are incorrect:
   (a) $10n^2 + 9 = O(n)$
   (e) $3^n = O(2^n)$

6. Determine the worst-case complexity of Program 1.22.

```
void transpose(int a[][MAX_SIZE])
{
    int i, j, temp;
    for(i = 0; i < MAX_SIZE-1; i++)
        for(j = i+1; j < MAX_SIZE; j++)
            SWAP(a[i][j], a[j][i], temp);
}
```

General Information:

- Deadline : 2018/10/3 (Please submit to TA after class)
- Late homework will not be accepted.
- Please write on **A4** papers.
- Notice : You won't get any point if you only write the answer, please list your process and reason.
- Any copies will be scored as zero. Do not plagiarize

Programming Homework1

(textbook p.17 Exercises 8)

8. The Fibonacci numbers are defined as: $f_0 = 0,\ f_1 = 1$, and $f_i = f_{i-1} + f_{i-2}$ for i > 1. Write both a **recursive** and **iterative** C/C++ function to compute f_i.

Input :

The input begins with a single positive integer ***N*** indicating the number of test cases. Then there are ***N*** test cases, each one consists of a single integer ***i*** on a line by itself with 0 <= ***i*** <= 30.

```
3        (number of test cases)
0        (i, 0 <= i <= 30)
1
6
```

Output :

```
0 0      (f_i, recursive solution and iterative solution)
1 1
8 8
```

Input :

```
2
13
15
```

Output :

```
233 233
610 610
```

General Information:

- Deadline : 2018/10/3 23:55.
- Upload your assignment to Moodle system.
- Upload file format : student-ID_Name.rar, Ex. F12345678_王小明.rar
- Your file should consist of the following items : Source Code & Readme file(Program description)
- Late homework will not be accepted.
- Any copies will be scored as zero. Do not plagiarize.