Homework #2
CENG 437 – Software Quality Management

In this homework you are expected to perform CFG (Control Flow Graph) Testing. You are given an insertion sort routine written in C language. The input array "`arr`" is the array to be sorted and the input "`n`" is the size of array "`arr`".

```
int[] insertionSort(int arr[], int n)
{
   if(n < 2)
       return arr;
   else {
       int i, key, j;
       for (i = 1; i < n; i++)
       {
           key = arr[i];
           j = i-1;
           while (j >= 0 && arr[j] > key)
           {
               arr[j+1] = arr[j];
               j = j-1;
           }
           arr[j+1] = key;
       }
       return arr;
   }

}
```

First write the code in Java and make it work. Then, you are expected to perform the tasks that are given to you below.

1. Draw a CFG for `insertionSort` (). Tag each statement with unique letters and tag each branch with unique numbers.

2. From the CFG, identify a set of entry–exit paths to satisfy the complete statement coverage criterion.

3. Identify additional paths, if necessary, to satisfy the complete branch coverage criterion.

4. For each path identified above, derive their path predicate expressions.

5. Solve the path predicate expressions to generate test input and compute the corresponding expected outcomes.

6. Are all the selected paths feasible? If not, select and show that a path is infeasible, if it exists.

7. Can you introduce faults in the routine so that these go undetected by your test cases designed for complete branch coverage?

8. Suggest a general way to detect the kinds of faults introduced in the previous step.

9. Finally write your unit test cases that matches your statement and branch coverage.

Submission Rules:

- **Due Date: 22.03.2018, 23:55**
- If any cheating is detected in your homework, will be graded as 0.
- Please submit your homework through CMS by exporting your Java Project.
- Please export your Java Project and homework document as the given format with your student ID: **StdID_CENG437_HW02.zip.** (Your group IDs are announced on CMS).