

MA 251 Data Structures
Laboratory Assignment 1
31-07-2011

Note: Upload your programs to the server at the end of the lab. Steps for uploading is given at the guidelines.

1. Translate the **insertion sort** algorithm discussed in class to a computer program. Count the number of steps, each statement of the code is executed. Print the running time of the algorithm
 - (a) in milli-seconds
 - (b) in terms of the number of times, the statements of the code are executed

Create three test cases for the program – best case, worst case and average case; and print both the running time (i.e. milliseconds and no. of steps) for each case.

2. The following pseudocode code is a popular sorting algorithm

```
Sort(A,n)
for i = 1 to n-1
    for j = n to 1
        if A[j] < A[j-1]
            swap(A[j],A[j-1])
```

Convert this code to a computer program. Implement swap(), using a function. The function should swap the numbers without using an additional variable.

Identify the loop invariant of the program and print it for each iteration. Print the running time of the program (#steps only) for all the three cases (as in Assignment 1) and compare it with that of insertion sort.