ESC101 : Fundamental of Computing
Lab 9 for Tuesday, 21 October 2008
Maximum marks = 10

Note :

1. (marks =2)
   Create an array A of integers. The length of the array is provided from command line. Fill this array with random integers in the range 0 to 999. Print the entire array and then print the value and index of the median. You may note that median of a set of n numbers is the number which has at most $n/2$ numbers greater than itself and at most $n/2$ numbers less than itself. Median need not be unique as you may observe easily. In case there are multiple medians, just print the index and value of any of them.

2. (marks=4)
   Write a program which has a method $merge(int[]A, int[]B)$ which merges two sorted arrays A and B to produce a sorted array C consisting of all the elements of A and B. For example if A is $[3, 9, 22, 66, 70]$ and B is $[-2, 10, 33, 100]$, then the method should return the reference to an array which is $[-2, 3, 9, 10, 22, 33, 66, 70, 100]$. You are **not allowed** to use any sorting algorithm in this method.

   To test your program and method, create two arrays A and B with length privided from command line, fill them with random integers, and then sort A and B separately and print them on the monitor. Then your program should invoke $merge(A, B)$ and print the final sorted array formed by merging the two arrays A and B.

3. (marks = 4)
   Create an array A of integers. The length of the array is povided from command line. Fill the array with numbers randomly generated in the range -1000 to 1000. Use the method provided on Lecture 28 and some additional ideas for this task. We define function $f(i, j)$ for all $0 \leq i \leq j \leq n-1$ as follows.
   $$f(i,j) = \sum_{k=i}^{k=j} A[k]$$
   Your aim is to output the pair (i_0, j_0) for which $f(i_0, j_0)$ is maximum over all pairs (i, j). For example if array is $[-1, 11, -9, 99, -3, -5]$, then the answer is $(1, 3)$. Solve this problem by designing suitable methods.