**CS 5V81.012 – Special Topics in Computer Science – F16**

**Optional Project 1**

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**Question 1:**

Implement Merge Sort (say, from Cormen's book) in Java using generics. Compare its running time on n > 1 million elements with another O(nlogn) algorithm, say for example, sorting using a priority queue:

**Merge Sort.java** has the code for merge sort algorithm in Java using generics.

**PrioritySort.java** has the code for Priority queue.

MergeSort algorithm is taking 1080 msec for sorting 1000000 elements whereas Priority Queue is taking 721msec to execute the same.

Hence, Priority Queue is better than merge sort in terms of running times for huge data.

**Question 2:** **problem2mergetwolist**.**java** has the code to this solution. The given code contains two lists one for string and one for double on which we tested the given functions. We added sorting and remove duplicates methods additionally to handle unordered and duplicate elements.

**Question 3: problem2AddSub.java** has the code to this solution. Two lists with base 10 are created and functions are tested on them. Both List elements and Base can be changed. add() to add large numbers, subtract() to subtract , appending() just to add elements to list.

**Question 4:**

**SortableList.java** has the code for merge sort implementation on linked lists. We have tried to implement merge sort on linked list in log(n) space without creating a new list in merge operation but we could not completely do it. But, we have attached our trial on achieving this, although it isn’t working exactly.

**Question 5:**

**MultiUnzip.java** has the code for multiunzip on a linked list.

k parameter can be passed to unzip function which executes the code based on given k.

**Question 6:** **ReverseSingleLinked**.**java** has the code to this solution. The reversePrintListRecursive(), ReversePrintList() reverses List non recursively and recursively respectively. reverse() and reveseRecursive() will just print the list in reverse order. The code contains two lists, with both String and Integer datatypes tested on them.

**Question 7:** **CircularList.java** has the code to this solution.