Laboratory Exercise 9

SORTING

1. By hand, trace through the steps insertion sort will use on each of the following lists. In each case, count the number of comparisons that will be made and the number of times an item will be moved.

   (a) The following three words to be sorted alphabetically: *triangle, square, pentagon.*

   (b) The three words above to be sorted according to the number of sides of the corresponding polygon, in *increasing* order.

   (c) The three words to be sorted according to the number of sides of the corresponding polygon, in *decreasing* order.

   (d) The following seven numbers to be sorted into increasing order: *26, 33, 35, 29, 19, 12, 22.*

   (e) The following list of 14 names to be sorted into alphabetical order: *Tim, Dot, Eva, Roy, Tom, Kim, Guy, Amy, Jon, Ann, Jim, Kay, Ron, Jan.*

2. A certain algorithm always requires 1000 operations, regardless of the amount of data input. Provide a big-O classification of the algorithm that reflects the efficiency of the algorithm as accurately as possible.

3. Write classes to sort an array of integers by *three different algorithms*, e.g. bubble sort, selection sort and insertion sort, and compute

   (a) the number of comparisons made;

   (b) the number of times that an item (say, the first item) is moved

   in each run of the program using the three sorting algorithms respectively.