CS 302 Introduction to Data Structures
University of Nevada, Las Vegas
Spring 18

Assignment 10
Due: Saturday, April 21, 2018

In this project you are asked to investigate a sorting algorithm, called "slowsort". Write a research report, which addresses all points below.

Implement the following sorting algorithm:

```
slowsort(a,left,right);
/* sorts sub-vector a[left,right] */
{
  if (left < right)
   {
      center = (left+right) / 2;
      slowsort(a,left,center);
      slowsort(a,center+1,right);
      if (a[center] > a[right]) exchange(a[center],a[right]);
      slowsort(a,left,right-1)
   }
}
```

1. Explain why the algorithm successfully sorts. You should use an inductive argument.
2. Now run the algorithm for different n, where the vector a is defined as follows:

```
for (int  i = 0  ; i < a.size(); i++ )
     a[i] = 1 + (int) (1000 * (sin (1.2 * i) * sin (1.2 * i)) )
```

3. For $n = 10$ (n is the size of the vector) modify the code to report all the exchanges taking place; in the form:

```
1|869|457|196|993|79|630|731|31|963|
now exchanging element 1 and 2
1|457|869|196|993|79|630|731|31|963|
now exchanging element 2 and 3
1|457|196|869|993|79|630|731|31|963|
```

:

4. Now take out all write statements, add a counter to count the number of comparisons between vector elements made for $n = 20, 40, 60, \ldots 200$ and tabulate the results.
5. Now take out the counter, measure the running time for $n = 20, 40, 60, \ldots 200$, and tabulate the running time results (in seconds). (How to measure time is descrived on the announcement page.)
6. It can be shown that the number of comparisons $t(n) \approx A\ n^{(B \log_2 n)}$ for suitable constants A and B. Find values A and B that match as best as possible what you found in item 4.

How to submit. Create one PDF file with your report. The header of the report should have your name. Email this file as an attachment to the TA, Mr. Kaushik Deshmukh, deshmk1@unlv.nevada.edu. Subject of your email must be "**Assignment 10**", **<your name>**, **<your student ID number>**.