**CS 302**
Homework, Asst. #01

Purpose:    Refresh concepts regarding C++ simple I/O, functions, and variable scoping, and compilation/linking. Verify successful installation of development environment.
Due:        Tuesday (9/02) → Must be submitted on-line before class.
Points:     Part A → 30 pts
            Part B → 50 pts


## Assignment:

## Part A:
Suppose you have a group of $N$ numbers and would like to select the $k$th smallest (zero-based indexing). There are many ways to solve this problem, two of which will be implemented for this assignment.

- Sorting → The first, fairly obvious solution, is to sort the numbers and access the $k$th element. Use a selection sort[1] algorithm.

- Recursive Approach → Another, less obvious method is to use a recursive selection algorithm (very similar to the standard Quicksort). The algorithm is outlined in Chapter 7 (7.7.6, pg 324). Convert the provided algorithm from using a vector to using an array.
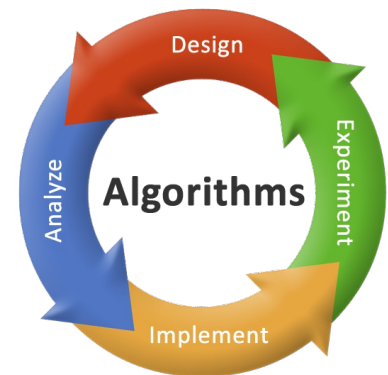
Use the provided main and implement both approaches and the applicable support routines.

*Note*, the random numbers generated and final results will be the same for everyone.


## Part B:
When completed, use the provided script to execute the program on a series of different counts of numbers (100,000, 200,000, …, and, 1,000,000). The script will write the execution times to a text file.

Enter the counts and times into a spreadsheet and create a line chart plot of the execution times for each algorithm. Refer to the example for how the plot should look.

Create and submit a write-up (open document or word format) with a write-up not too exceed 200 words including the following:

- Name, Assignment, Section
- Description of the machine used for obtaining the execution times.
- Copy of the chart.
- Explanation of the results, comparing the algorithms (one better, same, etc.).
- Comments regarding the use of recursion (good, bad, n/a).

*Note*, execution times for each submittal will be different (possibly very different).

---

1   For more information, refer to:  http://en.wikipedia.org/wiki/Selection_sort

## Example Plot:
Below is an example of the execution times plot (excluding the quick select times). This incomplete example show to appropriate format.

### Execution Times Plot

#### Sort vs Quick Select



The final chart should be complete and show the times for both algorithms (instead of just one as shown in the example above.

## Submission:
When complete, submit:
- Part A → A copy of the **source file** via the class web page (assignment submission link) by class time on the due date.
- Part B → A copy of the write-up including the chart. Must use ".odt", ".doc", ".txt", ".rtf", ".docx", or".pdf" format.

*Assignments received after the due date/time will not be accepted.*

You may re-submit as many times as desired. Each new submission will require you to remove (delete) the previous submission.

Make sure your program includes the appropriate documentation. See Program Evaluation Criteria for CS 302 for additional information.