Sample Quiz#2 : ENSF 694
Summer 2023

*** This is a sample quiz. The original quiz questions will be similar but not exactly the same.
*** Quiz#1 will have 1 question from complexity analysis, 1 question from searching and 1 question from sorting.
*** The questions in Quiz#1 will be set keeping in mind that you can finish answering, scanning, and uploading them within the given time.

Please read these carefully before you start:

- Solve and write your solutions on your own white papers in clean and well-organized manner. Scan or take a photo of each sheet which contains your answers. You can also write on an electronic device.
- You CANNOT use an editor/tool to produce your solutions, it must be all handwritten.
- Combine your answers in one PDF file and upload on D2L. The dropbox folder will accept only one file and will keep only the latest one.
- Late submission is not allowed. The dropbox will close exactly after 120 minutes. In case you have internet problems then send the PDF file as attached by email to kashfia.sailunaz@ucalgary.ca. However, your email must be stamped by the end of provided time, that is, you should hit send before the D2L closes to be fair to all students.
- Only students who have special permission issued by the accommodation center are allowed to take the extra time allowed and to send their solutions as attachment by email to kashfia.sailunaz@ucalgary.ca in case the D2L system will close for submissions because the D2L will close by the end of the time permitted for the general quiz.
- Late submission will lead to losing marks according to number of minutes late. You will receive 50% penalty for submitting 1 to 5 minutes after the deadline, 75% penalty for submitting after 6 to 10 minutes, and 100% penalty for any submission after 10 minutes or more.

Q1. (10 marks) Compute the time complexity of the following random code snippet and show the Big O value. Show the running time for each step/line and then show the total time complexity. No marks for mentioning only the final/total time complexity.

```
Line 1. int a = 10;
Line 2. int as = a * a;
Line 3. for (int i = 1; i <= n; i++){
Line 4.       int j = 1;
Line 5.       while (j < n){
Line 6.             int r = ((as + a)/2) – ((as * a)/5);
Line 7.             j = j * 2; }
Line 8.       return r; }
Line 9. for (int k = n; k > 0; k--){
Line 10.      a = 10 * 7; }
```

(You can mention the running time for each line by mentioning the line number and then compute the final complexity.)

Q2. (15 marks) Apply the interpolation search algorithm on the following array with the search key 5 and show each step of computation and each step of the iteration on the array. Show the pos and mid calculation at every step.

Array	1	4	5	5	9	12	15	17	18	23	33	34	38	42	50
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Q3. (15 marks) Apply the quicksort algorithm on the following array to sort it in ascending order and show each step of computation and each step of the iteration on the array. Assume the first item as pivot. Show the first, last and pivot pointers at every step and show all swaps.

Array	15	4	55	51	90	14	12	50	95	23
Index	0	1	2	3	4	5	6	7	8	9