**CPSC-503 Algorithms and Data Structures**

Spring 2022

Midterm Exam

Submit your exam no later than Monday 04/11/2022 midnight

Develop two algorithms using Python language, first method to remove the second element in the queue without removing the first one, and the second method to insert it before last element in the queue, apply the algorithms in following five scenarios:

* Implementing simple queue using Array module
* Implementing simple queue using List
* Implementing circular queue using List
* Implementing queue using Singly Linked list
* Implementing queue using Doubly linked list

The implementation for each scenario is provided in a Python file with five classes, one class for each scenario, you need to use it to add the new algorithms to each class accordingly.

* remove\_second\_element(self)
* insert\_before\_last(self, value)

Use print\_queue method provided in the code for each scenario to test your work

Example:

Before: 5 **10** 15 20 25

After: 5 15 20 **10** 25

Analysis:

After you develop your algorithms, in a short statement show the analysis for each one of the scenarios in terms of memory locations used and time complexity and then create a table to compare between the five scenarios. Rank the methods in terms of memory efficiency and time efficiency.

Notes:

* You should not remove the first element from the queue
* Create a Python project and then copy the provided Python file and paste in it
* Test your code and make sure it is free of errors and it is functioning in proper way. Use testing data and print queue before and after
* Use your name for your Python file: **FirstName\_LastName.py**
* I believe in that no two programmers produce same code for the same problem. I do not expect to see two students to have the same code and analysis
* You must submit two files:
  + Python code and
  + word document to show the analysis part

Grading Rubric

* 60% developing the algorithms (logic and syntax)
* 20% calling the methods with no errors and correct results
* 20% for the analysis and the comparison