

SCC461 – Programming for Data Scientists

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Week 7

Assignment

Deadline: Monday, 27/11, 9am

Upload on Moodle your code, your test cases (with the output), your reply to Question 3, and your short reflection.

1. FibonacciQueue (2%)

In a Queue, items are removed in the same order that they are inserted. That is, the first item to be inserted will be the first one to be removed. In a FibonacciQueue, the x th item removed will be multiplied by the x th number in the Fibonacci sequence.

- Create a FibonacciQueue class for storing integers.
- Using the FibonacciQueue class, create a program that:
 - Receives integers until -1 is inputted. The numbers are stored in the FibonacciQueue in the order that they are received.
 - Receives an integer x .
 - Removes x numbers from the FibonacciQueue, and prints them one-by-one.
 - **You must use the Linked List technique!**

For example:

Input	You print
5, 2, 3, 4, -1, 3	0, 2, 3
10, 5, 3, 7, 5, 3, -1, 5	0, 5, 3, 14, 15
6, 25, 6, 3, 4, 2, -1, 6	0, 25, 6, 6, 12, 10

2. PriorityQueue (2%)

In a priority queue, each item x has an associated priority y . When items are removed, they must be removed from the highest to the lowest priority. We will assume that 1 is the highest priority. If two items have the same priority, the item that was inserted into the queue first must be removed first.

- Implement a PriorityQueue class for storing integers.
- **You must use the Linked List technique!**

- Using the PriorityQueue class, create a program that:
 - Receives integers until -1 is inputted. The numbers are stored in the PriorityQueue in the order that they are received. For each number x received, the next number y inputted is going to be number x 's priority.
 - Receives an integer m
 - Removes m numbers from the PriorityQueue, and prints them one-by-one.

For example:

Input	You print
5, 1, 7, 3, 8, 2, 4, 3, -1, 4	5, 8, 7, 4
9, 2, 7, 2, 5, 2, 10, 1, -1, 3	10, 9, 7
5, 10, 4, 20, 3, 1, 7, 50, -1, 2	3, 5

3. The Early History of SmallTalk (1%)

Based on Kay, 1993 (Introduction and Section 11.1), which previous systems inspired Alan Kay in the creation of OOP programming, and how did they inspire him?

As mentioned in class, you must write a short text reflecting how you approached these problems. You must also report who you discussed with, what you searched online, who you helped, etc. Discussions are allowed, and looking for online materials, books, etc, is allowed. However, directly copying full Python code is not allowed.