Data Structure:
Homework for sequences

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Fall 2024

- Deadline: 11:00 PM on Saturday, December 13, 2024.
- Answer the questions in Section 1 in a PDF file. Implement your source code for the programming assignment in .h, .cpp, or .ipynb files. Submit both the PDF and code files to the course e-learning platform.

1 Question and answer

1. (20 points) Briefly describe how to perform a new sequence function makeFirst(p) that moves an element of a sequence S at position p to be the first element in S while keeping the relative ordering of the remaining elements in S unchanged. Your function should run in O(1) time if S is implemented with a doubly linked list.

2 Programming assignment

To demonstrate the correctness of your code, ensure that your source code includes test cases within the main function.

1. (40 points) Give C++ code describing how to implement all the operations in the sequence ADT using an array used in a circular fashion.
2. (40 points) Suppose we want to extend the Sequence abstract data type with functions indexOfElement(e) and positionOfElement(e), which respectively return the index and the position of the (first occurrence of) element e in the sequence. Show how to implement these functions by expressing them in terms of other functions of the Sequence interface.