Data Structure:
Homework for stacks, queques, and deques

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- Deadline: Friday, November 15, 2024, at 11:00 PM.
- Please submit your solution to the question and answer as a PDF file on the course e-learning platform. For programming assignments, upload your .h and .cpp files or an .ipynb file. Your source code must include a main function, and to demonstrate its correctness, please ensure that you include test cases within this function.

1 Question and answer

1. (10 points) Describe the output of the following series of stack operations: push(5), push(3), pop(), push(2), push(8), pop(), pop(), push(9), push(1), pop(), push(7), push(6), pop(), pop(), push(4), pop(), pop().
2. (10 points) Describe the output for the following sequence of queue operations: enqueue(5), enqueue(3), dequeue(), enqueue(2), enqueue(8), dequeue(), dequeue(), enqueue(9), enqueue(1), dequeue(), enqueue(7), enqueue(6), dequeue(), dequeue(), enqueue(4), dequeue(), dequeue().
3. (10 points) Describe the output for the following sequence of deque operations: insertFront(3), insertBack(8), insertBack(9), insertFront(5), removeFront(), eraseBack(), first(), insertBack(7), removeFront(), last(), eraseBack().

2 Programming assignment

1. (20 points) Modify the stack ADT implementation from Section 5.1.5 of the textbook (or as shown in the lecture slides on implementing a stack with a generic linked list) to make it a fully generic class using templates.
2. (25 points) Implement a version of the deque ADT with a fixed capacity, using an array in a circular structure similar to the circular queue implementation discussed in Section 5.2.4 of the textbook (or as covered in the lecture slides on queues using arrays in a circular manner).
3. (25 points) Implement the queue ADT in a fully generic manner using a dynamically allocated C++ array.