ASSIGNMENT4

Exercise 4 Reworked:

Initial Step: Queue Population

Initially, elements are transferred from the stack to the queue. This involves popping each element from the stack and enqueuing it, a process that for n stack elements, will require $O(n)$ time due to the sequential popping and enqueuing of each item.

Subsequent Step: Stack Repopulation

Following this, elements from the queue are systematically removed and placed back into the stack. For a queue containing n elements, similar to the initial step, this action requires $O(n)$ time since each item must be dequeued and then pushed onto the stack.

- Considering the entirety of the population and repopulation steps, the comprehensive time complexity of this methodology is $O(n) + O(n) = O(2n)$, which reduces to $O(n)$.

- The requirement for space within this algorithm is dependent on the capacities needed for both the stack and the queue. Given that each structure will accommodate the same quantity of elements as the starting stack, the space necessity is $O(n)$.

To conclude, the described process maintains a time complexity as well as a space complexity of $O(n)$.