Day-12 Task3

Task 3: Queue Sorting with Limited Space
You have a queue of integers that you need to sort. You can only use additional space equivalent to one stack. Describe the steps you would take to sort the elements in the queue.

Solution:

To sort the elements in the queue using only one stack, you can implement the following steps:

1. **Initialize a stack**: Create an empty stack.

2. **Dequeue and push**: Dequeue elements from the queue one by one and push them onto the stack.

3. **Sort the stack**: Implement a sorting algorithm (e.g., insertion sort, selection sort, or merge sort) using the stack. Since you can only use additional space equivalent to one stack, you'll need to perform the sorting operation within the same stack. For example, you could implement a modified version of merge sort where you merge elements back into the stack instead of creating a separate array.

4. **Pop and enqueue**: Pop elements from the sorted stack one by one and enqueue them back into the queue.

Here's a more detailed explanation of the steps:

- Dequeue elements from the queue and push them onto the stack until the queue is empty. At this point, the stack will contain all the elements from the queue in reverse order.

- Perform sorting operations on the stack using the chosen sorting algorithm. This will rearrange the elements in ascending order.

- After sorting, pop elements from the stack and enqueue them back into the queue. Since the stack was sorted in ascending order, the elements will be enqueued back into the queue in sorted order.

This approach effectively sorts the elements in the queue using only one stack and no additional data structures.