1. Explain the similarities between an array and a stack.

Both arrays and stacks are linear data structures.

Both allow elements to be accessed using an index or position.

In both, the size can be fixed (in static implementations) or dynamic (using linked list or dynamic array).

In a stack, elements are accessed in a Last In, First Out (LIFO) manner, while in an array, elements can be accessed in any order.

3. What output is generated by the following statements if s is a Stack object?

Output: 8 13 12

4. Consider the “hot plate” problem:

In a busy restaurant, fresh salad plates are added to the top of a stack, and plates are taken from the top when served. If the stack becomes too large, the customer may not get the freshest plate.

This is analogous to a stack because the plates are served in a Last In, First Out (LIFO) order. The last plate added to the stack is the first one served, similar to how a stack operates.

5. What output is generated by the following statements if q is a Queue object?

Output: 5 8 12

6. Explain the difference between a FIFO and a LIFO data structure.

FIFO (First In, First Out):

In FIFO, the first element added to the structure is the first one to be removed. Queues follow this principle. For example, customers in a bank queue are served in the order they arrive.

LIFO (Last In, First Out):

In LIFO, the last element added to the structure is the first one to be removed. Stacks follow this principle. For example, plates stacked in a kitchen are used in reverse order of stacking.

7. List two real-world situations that could be represented as a queue structure other than those listed in the chapter.

Printer Queue: Documents waiting to be printed are processed in the order they are sent to the printer.

Help Desk Tickets: Customer support tickets are resolved in the order they are received to ensure fairness.