

Chapter 13 CRT

1. Both Arrays and stacks are linear data structures meaning they store data sequentially in memory. Moreover both can be adapted to be sized statically (fixed size) or dynamically (no defined limit to size) by using ArrayLists. Moreover, we usually implement stacks using arrays and so they are interconnected. Both also have a set of methods that can be used to change or display data associated with the array or stack.
2. A programmer might use a stack in a compiler software to handle operator precedence when computing math (i.e. PEMDAS/BEDMAS) this is because a stack can handle only one element of data at a time forcing it to use a set precedence from the top-down. Also, a common use is for parenthesis. To ensure every open parenthesis has a corresponding closed parenthesis you can push every open parenthesis into a stack and pop every corresponding closed parenthesis to identify a matching pair.
3. The output is
"8 13"
"8 12"
4. As new salad plates are always placed on top, the top plates are mostly warm. This works like the push method for a stack where new data elements are added to the top of the stack. And older elements are buried underneath just like the cold plates. Moreover, a customer frequently receives a warm plate of salad because they are taken from the top of the pile. This works exactly like the pop method in a stack where elements are removed from the top of the list.
5. The output is
"5 8"
"12 5"
6. A FIFO structure means "first in first out" while a LIFO structure means "last in first out". To understand the difference, consider the following situation.
Let the following data elements be added into an array in the following order:

"Red" then **"Blue"** then **"Yellow"**.

Removing an element would be different for both data structures.

For the FIFO structure, the element "Red" would be removed, because it was the first element to be added in, so it is the first element to be removed.

In the LIFO structure, the element "Yellow" would be removed first. This is because it was the last element to be added and it is therefore the first element to be removed from the structure.

7. The first situation would be buying an item at the store. You enter a line with other people to buy an item. The earlier you are in the line, the earlier you get to pay and leave.

Another situation is a traffic jam. The first people to stop at the traffic light are the first to leave, while the people at the end are the last to leave.

- 8.
- a. False. A stack only has the top. It is a LIFO structure and all actions are done relative to the top only.
 - b. True.
 - c. False. The top refers to the last(most recent) item pushed onto the stack.
 - d. False. The isEmpty operation returns a boolean value, true or false.
 - e. True.
 - f. False. All removals in a queue are made at the front. Its a FIFO structure. Since all items are added from the rear the front item is the first item in so it will be the first item out.
 - g. False. The enqueue operation adds an item to the back of the queue.
 - h. True.
 - i. False. A node is a data element in a linked list which points to the next item/node. There are no nodes in stacks
 - j. False. We use the size() operation, not the length operation of an array.
 - k. True.