Lecture 2: Linear Array Manipulation Examples

Practice Problems (Beginner Level) on Linear Arrays

1. Write a code with a reverse and print method which reverses the values of an array and prints the values, using an out-of-place approach.

   Sample Input:

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	50	40	30	20	10

2. Write a code with a reverse and print method which reverses the values of an array and prints the values, using an in-place approach.

   Sample Input:

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	50	40	30	20	10

Practice Problems (Intermediate Level) on Linear Arrays

3. Write a code with two methods which does right shifting by one place on an array and prints the values of the manipulated array, respectively.

   Sample Input:

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	0	10	20	30	40

4. Write a code with two methods which does right rotating by one place on an array and prints the values of the manipulated array, respectively.

   Sample Input:

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	50	10	20	30	40

5. Write a code with two methods which does right rotating by k number of places on an array and prints the values of the manipulated array, respectively. K is an integer number which will be inputted by the user.

   Sample Input:

   k = 2

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	0	0	10	20	30

   Sample Input:

   k = 3

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	0	0	0	10	20

6. Write a code with two methods which does right rotating by k number of places on an array and prints the values of the manipulated array, respectively. K is an integer number which will be inputted by the user.

   Sample Input:

   k = 2

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	40	50	10	20	30

   Sample Input:

   k = 3

Index	0	1	2	3	4
Values	10	20	30	40	50

   Sample Output:

Index	0	1	2	3	4
Values	30	40	50	10	20

Practice Problems (Advanced Level) on Linear Arrays

7. An array consists of the values, a = [10, 20, 30, 40, 50]. You have been asked to insert the value 200 in index 2. You must also ensure that the array is compact. (Remember insertion is not the same as replacing!)

   Sample Input:

   insertion (a, 2, 200, 5)

Index	0	1	2	3	4	5	6	7
Values	10	20	30	40	50	0	0	0

   Sample Output:

Index	0	1	2	3	4	5	6	7
Values	10	200	20	30	40	50	0	0

8. An array consists of the values, a = [10, 20, 30, 40, 50]. You have been asked to remove the value in index 2. You must also ensure that the array is compact.

   Sample Input:

   remove (a, 2, 200, 5)

Index	0	1	2	3	4	5	6	7
Values	10	20	30	40	50	0	0	0

   Sample Output:

Index	0	1	2	3	4	5	6	7
Values	10	20	40	50	0	0	0	0

Lecture 3: Introduction to Circular Arrays

9. Forward print the following circular array: a = [40, 50, 0, 0, 0, 0, 0, 0, 10, 20, 30]

   Sample Input:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	40	50	0	0	0	0	0	0	10	20	30

   Sample Output: 10, 20, 30, 40, 50

10. Reverse print the following circular array: [10, 20, 30, 40, 50, 0, 0, 0, 0, 0, 0]

    Sample Input:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	10	20	30	40	50	0	0	0	0	0	0

    Sample Output: 50, 40, 30, 20, 10

Practice Problems (Beginner Level) on Circular Arrays

11. Convert the linear array, a = [10, 20, 30, 40, 50, 0, 0, 0, 0, 0, 0] to a circular array starting at index 6.

    Sample Input:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	10	20	30	40	50	0	0	0	0	0	0

    Sample Output:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	40	50	0	0	0	0	0	0	10	20	30

12. Convert the circular array, a = [40, 50, 0, 0, 0, 0, 0, 0, 10, 20, 30] to a linear array starting at index 6.

    Sample Input:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	40	50	0	0	0	0	0	0	10	20	30

    Sample Output:

Index	0	1	2	3	4	5	6	7	8	9	10
Values	10	20	30	40	50	0	0	0	0	0	0

Practice Problems (Intermediate Level) on Circular Arrays

13. Resize a linear array from size 5 to size 7.

Sample Input:

Index	0	1	2	3	4
Values	10	20	30	40	50

Sample Output:

Index	0	1	2	3	4	5	6
Values	10	20	30	40	50	0	0

14. Resize a circular array from size 5 to size 7, such that the start value is at index 4.

Sample Input:

Index	0	1	2	3	4
Values	20	30	40	50	10

Sample Output:

Index	0	1	2	3	4	5	6
Values	50	0	0	10	20	30	40

Practice Problems (Basic) on Linked Lists

15. Write the code for creating a Node class and creating a MyList class with a constructor which takes input from an array.
16. Write the code for a singly linked list which outputs the number of nodes in the list.

    Sample Input: [20, 40, 60, 80, 100]

    Output: 5
17. Write the code for a singly linked list which outputs the value at a particular index in an array, both given by the user.

    Sample Input: [20, 40, 60, 80, 100], 3

    Output: 80
18. Write the code for a singly linked list which searches for a particular value in an array, both given by the user and outputs True if the value is present in the list or False if the value is not present in the list. The program must also output the value of the index if the value is present in the list, otherwise outputs -1.

    Sample Input: [20, 40, 60, 80, 100], 40

    Output: True, 1

    Sample Input: [20, 40, 60, 80, 100], 50

    Output: False, -1

Practice Problems (Advanced) on Linked Lists

19. Write the code for a singly linked list which can insert a node anywhere in the linked list.

    a) add_begin

    Sample Input: [20, 40, 60, 80, 100], [10]

    Output: 10, 20, 40, 60, 80, 100

    b) add_end

    Sample Input: [20, 40, 60, 80, 100], [110]

    Output: 20, 40, 60, 80, 100, 110

    c) add_index

    Sample Input: [20, 40, 60, 80, 100], [70, [3]

    Output: 20, 40, 60, 80, 100, 110

20. Write the code for a singly linked list which can remove a node anywhere in the linked list.

    a) remove_begin

    Sample Input: [20, 40, 60, 80, 100], [10]

    Output: 10, 20, 40, 60, 80, 100

    b) remove_end

    Sample Input: [20, 40, 60, 80, 100], [110]

    Output: 20, 40, 60, 80, 100, 110

    c) remove_index

    Sample Input: [20, 40, 60, 80, 100], [70, [3]

    Output: 20, 40, 60, 80, 100, 110