ADS Lab Exam Practice Questions – Set 2

Array

Q1. Rotate Array by K Positions
Problem: Given an array, rotate it to the right by K steps.
Input:
- First line: integer n
- Second line: n space-separated integers
- Third line: integer k
Output:
- Array after rotation
Example:
Input:
5
1 2 3 4 5
2
Output:
4 5 1 2 3

Array

Q2. Find the Missing Number
Problem: Given n-1 numbers from 1 to n, find the missing number.
Input:
- First line: integer n
- Second line: n-1 space-separated integers
Output:
- Missing number
Example:
Input:
5
1 2 4 5
Output:
3

Linked List

Q3. Reverse a Linked List
Problem: Reverse a singly linked list.
Input:
- First line: integer n
- Second line: n space-separated integers
Output:
- Reversed linked list
Example:
Input:
4
10 20 30 40
Output:
40 30 20 10

Linked List

Q4. Detect Loop in Linked List
Problem: Detect if a linked list contains a cycle (use Floyd's algorithm).
Input:
- First line: integer n
- Second line: n space-separated integers
- Third line: integer pos (position where tail connects, -1 for no loop)
Output:
- Print "Loop Found" or "No Loop"
Example:
Input:
5
1 2 3 4 5
2
Output:
Loop Found

Stack

Q5. Next Greater Element
Problem: For each element, print the next greater element to its right. Use stack.
Input:
- First line: integer n
- Second line: n space-separated integers

Output:
- Next greater elements
Example:
Input:
4
4 5 2 25
Output:
5 25 25 -1

Stack

Q6. Convert Infix to Postfix
Problem: Convert an infix expression to postfix using stack.
Input:
- A string containing infix expression
Output:
- Postfix expression
Example:
Input:
(A+B)*C
Output:
AB+C*

Queue

Q7. Implement Priority Queue
Problem: Implement a priority queue where higher number = higher priority.
Input:
- Commands: INSERT x, DELETE, DISPLAY, STOP
Output:
- After each DISPLAY, print queue elements in priority order
Example:
Input:
INSERT 10
INSERT 50
INSERT 20
DELETE
DISPLAY
STOP

Output:
20 10

Queue

Q8. First Non-Repeating Character in Stream
Problem: Given a stream of characters, print the first non-repeating character at each step.
Input:
- A string
Output:
- Characters separated by space (use queue)
Example:
Input:
aabc
Output:
a a b b

Recursion

Q9. Count Ways to Climb Stairs
Problem: You are given N steps. You can climb 1 or 2 steps at a time. Count the number of ways using recursion.
Input:
- Integer n
Output:
- Number of ways
Example:
Input:
4
Output:
5

Recursion

Q10. Find Power Using Recursion
Problem: Compute a^b using recursion.
Input:
- Two integers a and b
Output:

- Result
Example:
Input:
2 10
Output:
1024

Searching Algorithms

Q11. Find First and Last Occurrence (Binary Search)
Problem: In a sorted array, find the first and last position of a target value.
Input:
- First line: integer n
- Second line: n space-separated sorted integers
- Third line: integer target
Output:
- Two integers: first and last index (0-based), or -1 -1 if not found
Example:
Input:
7
2 4 4 4 6 7 8
4
Output:
1 3

Searching Algorithms

Q12. Jump Search
Problem: Perform Jump Search on a sorted array.
Input:
- First line: integer n
- Second line: n space-separated sorted integers
- Third line: integer key
Output:
- Index (0-based) if found, else -1
Example:
Input:
6
1 3 5 7 9 11
7

Output:
3

Sorting Algorithms

Q13. Selection Sort
Problem: Sort an array using Selection Sort.
Input:
- First line: integer n
- Second line: n space-separated integers
Output:
- Sorted array
Example:
Input:
5
64 25 12 22 11
Output:
11 12 22 25 64

Sorting Algorithms

Q14. Quick Sort
Problem: Sort an array using Quick Sort.
Input:
- First line: integer n
- Second line: n space-separated integers
Output:
- Sorted array
Example:
Input:
6
10 7 8 9 1 5
Output:
1 5 7 8 9 10

Sorting Algorithms

Q15. Heap Sort
Problem: Sort an array using Heap Sort.

Input:
- First line: integer n
- Second line: n space-separated integers
Output:
- Sorted array
Example:
Input:
6
4 10 3 5 1 2
Output:
1 2 3 4 5 10